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EXHIBIT B

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN**

WESLEY WON, *et al.*, individually
and on behalf of all others similarly
situated,

Plaintiffs,

vs.

GENERAL MOTORS, LLC,

Defendant.

Civil Action No. 2:19-cv-11044

Hon. David M. Lawson

Magistrate Judge David R. Grand

**PLAINTIFFS' MOTION FOR CLASS CERTIFICATION AND
APPOINTMENT OF CLASS REPRESENTATIVES AND CLASS
COUNSEL**

Plaintiffs, by and through counsel, respectfully move this Court for class certification pursuant to Federal Rule of Civil Procedure 23 on behalf of themselves and all others similarly situated and for the appointment of Counsel and Class Representatives pursuant to Fed. R. Civ. P. 23(g)). The bases for this motion are set forth in the accompanying Brief in Support of Plaintiffs' Motion for Class Certification, exhibits thereto, deposition testimony, the record in this case, and any arguments the Court may consider. Pursuant to Local Rule 7.1, the parties met and conferred on February 4, 2022 regarding the legal basis for certifying the proposed classes. Defendant does not concur in the relief sought in this Motion.

Specifically, Plaintiffs propose certification of the following Classes pursuant to Federal Rule of Civil Procedure 23(b)(3):

1. Florida Class, represented by Rhianna Meyers, Richard Sullivan, and Tait Thomas, certified for claims under the Florida Deceptive and Unfair Trade Practices Act ("FDUTPA"), Fla. Stat. § 501.201 *et seq.*: All original purchasers who purchased in Florida new Class Vehicles from authorized GM dealers before March 1, 2019;

2. Texas Class, represented by Darrin DeGrand, certified for claims under the Texas Deceptive Trade Practices Act ("TDTPA"), Texas Bus. & Com. Code § 17.41 *et seq.*, and breach of express warranty, § 2.313: All original purchasers who purchased in Texas new Class Vehicles from authorized GM dealers before March

1, 2019;

3. Alabama Class, represented by Brian Lloyd, certified for claims under the Alabama Deceptive Trade Practices Act (“ADTPA”), Ala. Code § 8-19-1 *et seq.*, and breach of express warranty, § 7-2-313: All original purchasers who purchased in Alabama new Class Vehicles from GM authorized dealers before March 1, 2019;

4. Arizona Class, represented by Maria Barallardos, certified for claims under the Arizona Consumer Fraud Act: All used purchasers/current owners who purchased in Arizona Class Vehicles from authorized GM dealers before March 1, 2019;

5. Arkansas Class, represented by James Paul Browne, certified for claims under the Arkansas Deceptive Trade Practices Act, Ark. Stat. § 4-88-107 *et seq.*, and breach of implied warranty, § 4-2-314: All used purchasers/current owners who purchased in Arkansas Class Vehicles from authorized GM dealers before March 1, 2019;

6. Colorado Class, represented by Daniel Drain, certified for claims under breach of express warranty, Colo. Rev. Stat. § 4-2-313, and breach of implied warranty, § 4-2-314: All original purchasers who purchased in Colorado new Class Vehicles from authorized GM dealers before March 1, 2019;

7. Delaware Class, represented by Richard Filiaggi, certified for claims under the Delaware Consumer Fraud Act (“DCFA”), Del. Code Ann. tit. 6, § 2511

et seq., breach of express warranty, § 2-313, and breach of implied warranty, § 2-314: All original purchasers who purchased in Delaware new Class Vehicles from authorized GM dealers before March 1, 2019;

8. Georgia Class, represented by Philip Weeks, certified for claims under breach of express warranty, Ga. Code. Ann. § 11-2-313, and breach of implied warranty, § 11-2-314: All original purchasers who purchased in Georgia new Class Vehicles from authorized GM dealers before March 1, 2019;

9. Idaho Class, represented by Cary Sherrow, certified for claims under the Idaho Consumer Protection Act (“ICPA”), Idaho Code § 48-601 *et seq.*, and breach of express warranty, § 28-2-313: All original purchasers who purchased in Idaho new Class Vehicles from authorized GM dealers before March 1, 2019;

10. Illinois Class, represented by Dennis Speerly, certified for claims under the Illinois Consumer Fraud and Deceptive Business Practices Act (“ICFA”), 815 Ill. Comp. Stat. § 505/1 *et seq.*, breach of express warranty, 810 Ill. Comp. Stat. § 5/2-313, breach of implied warranty, § 5/2-314, and fraudulent concealment: All original purchasers who purchased in Illinois new Class Vehicles from authorized GM dealers before March 1, 2019;

11. Kansas Class, represented by Guy Clark, certified for claims under the Kansas Consumer Protection Act (“KCPA”), Kan. Stat. Ann. § 50-623 *et seq.*, breach of express warranty, § 84-2-313, and breach of implied warranty, § 84-2-314:

All original purchasers who purchased in Kansas new Class Vehicles from authorized GM dealers before March 1, 2019;

12. Kentucky Class, represented by James Norvell, certified for claims under the Kentucky Consumer Protection Act (“KCPA”), Ky. Rev. Stat. § 367.110 *et seq.*, and breach of express warranty, § 335.2-313: All original purchasers who purchased in Kentucky new Class Vehicles from authorized GM dealers before March 1, 2019;

13. Louisiana Class, represented by Daniel Dykshorn, certified for claims under the Louisiana Unfair Trade Practices and Consumer Protection Law (“LUTPA”), La. Stat. Ann. § 51:1401 *et seq.*, and fraudulent concealment: All original purchasers who purchased in Louisiana new Class Vehicles from authorized GM dealers before March 1, 2019;

14. Maine Class, represented by Robert Higgins, certified for claims under the Maine Unfair Trade Practices Act (“MUTPA”), Me. Stat. tit. 5, § 205-A *et seq.*, breach of express warranty, § 2-313, and breach of implied warranty, § 2-314: All original purchasers who purchased in Maine new Class Vehicles from authorized GM dealers before March 1, 2019;

15. Michigan Class, represented by Louis Ray, certified for claims under the Michigan Consumer Protection Act, Mich. Comp. Laws § 445.903 *et seq.*, and breach of implied warranty, § 440.2313: All used purchasers/current owners who

purchased in Michigan Class Vehicles from authorized GM dealers before March 1, 2019;

16. Minnesota Class, represented by Troy and Kimberly Coulson, certified for claims under the Minnesota Consumer Fraud Act (“MCFA”), Minn. Stat. 325F.68 *et seq.*, breach of express warranty, § 336.2-313, and breach of implied warranty, § 336.2-314: All original purchasers who purchased in Minnesota new Class Vehicles from authorized GM dealers before March 1, 2019;

17. New Hampshire Class, represented by Michael Banks, certified for claims under the New Hampshire Consumer Protection Act (“NHCPA”), N.H. Rev. Stat. Ann. § 358-A:1 *et seq.*, breach of express warranty, § 382-A:2-313, and breach of implied warranty, § 382-A:2-314: All original purchasers who purchased in New Hampshire new Class Vehicles from authorized GM dealers before March 1, 2019;

18. New Jersey Class, represented by Randall Jacobs and Joseph Sierchio, certified for claims under the New Jersey Consumer Fraud Act (“NJCFA”), N.J. Stat. Ann. § 56:8-1 *et seq.*, breach of express warranty, § 12A:2-313, and breach of implied warranty, § 12A:2-314: All original purchasers who purchased in New Jersey new Class Vehicles from authorized GM dealers before March 1, 2019;

19. New York, represented by Andre McQuade, certified for claims under the New York General Business Law § 349, breach of express warranty, N.Y. U.C.C. § 2-313, breach of implied warranty, § 2-314, and fraudulent concealment: All used

purchasers/current owners who purchased in New York Class Vehicles from authorized GM dealers before March 1, 2019;

20. North Carolina Class, represented by Steven Brack, certified for claims under the North Carolina Unfair and Deceptive Acts and Practices Act (“NCUDPA”), N.C. Gen. Stat. § 75-1.1 *et seq.*: All original purchasers who purchased in North Carolina new Class Vehicles from authorized GM dealers before March 1, 2019;

21. Oklahoma Class (“OCPA”), represented by John Ellard, certified for claims under the Oklahoma Consumer Protection Act, Okla. Stat. tit. 15, § 751 *et seq.*, breach of express warranty, Okla. Stat. tit. 12A, § 2-313, and breach of implied warranty, Okla. Stat. tit. 12A, § 2-314: All original purchasers who purchased in Oklahoma Class new Vehicles from authorized GM dealers before March 1, 2019;

22. Pennsylvania Class, represented by Karina and William Fredo, certified for claims under the Pennsylvania Unfair Trade Practices and Consumer Protection law: All used purchasers/current owners who purchased in Pennsylvania Class Vehicles from authorized GM dealers before March 1, 2019;

23. South Carolina Class, represented by Donald Sicura and Jason Sinclair, certified for claims under breach of express warranty, S.C. Code Ann. § 36-2-313, and breach of implied warranty, § 36-2-314: All buyers who purchased in South Carolina new Class Vehicles from authorized GM dealers before March 1, 2019;

24. Tennessee, represented by David Thompson, certified for claims for the Tennessee Consumer Protection Act, Tenn. Code Ann. § 47-18-101 *et seq.*, and fraudulent concealment: All used purchasers/current owners who purchased in Tennessee Class Vehicles from authorized GM dealers before March 1, 2019;

25. Washington Class, represented by Jerry and Kim Carroll, certified for claims under the Washington Consumer Protection Act (“WCPA”), Wash. Rev. Code § 19.86.010 *et seq.*, breach of express warranty, § 62a.2-313, and fraudulent concealment: All buyers who purchased in Washington new Class Vehicles from authorized GM dealers before March 1, 2019;

26. Wisconsin Class, represented by Dominic Eatherton, certified for claims under the Wisconsin Deceptive Trade Practices Act, Wis. Stat. § 100.18: All used purchasers/current owners who purchased in Wisconsin Class Vehicles from authorized GM dealers before March 1, 2019.

The Class Vehicles are General Motors Model Year (“MY”) 2015–2019 vehicles with 8L transmissions, specifically: the 2015-2019 Chevrolet Silverado; 2017-2019 Chevrolet Colorado; 2015-2019 Chevrolet Corvette; 2016-2019 Chevrolet Camaro; 2015-2017 Cadillac Escalade and Escalade ESV; 2016-2019 Cadillac CTS; 2016-2018 Cadillac CT6; 2015-2019 GMC Sierra; 2015-2017 Yukon and Yukon XL; and 2017-2019 GMC Canyon.

Plaintiffs also move for the appointment of Plaintiffs Brian Lloyd, Daniel

Drain, Richard Filiaggi, Richard Sullivan, Tait Thomas, Rhianna Meyers, Philip Weeks, Cary Sherrow, Dennis Speerly, Guy Clark, James Norvell, Donald Dykshorn, Robert Higgins, Kimberly Coulson, Troy Coulson, Steven Brack, Michael Banks, Joseph Sierchio, Randall Jacobs, Jon Ellard, Jason Sinclair, Donald Sicura, Darrin DeGrand, Jerry Carroll, Kim Carroll, Maria Barallardos, James Paul Browne, Dominic Eatherton, Karina Fredo, William Fredo, Andre McQuade, Louis Ray, and David Thompson as Class Representatives; and the appointment of Theodore J. Leopold as Lead Class Counsel pursuant to Fed. R. Civ. P. 23(g).

February 7, 2022

Respectfully submitted,

/s/ Theodore Leopold

Theodore J. Leopold

**COHEN MILSTEIN SELLERS &
TOLL PLLC**

2925 PGA Boulevard, Suite 200

Palm Beach Gardens, FL 33410

Telephone: (561) 515-1400

tleopold@cohenmilstein.com

Interim Lead Counsel for Plaintiffs

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**PLAINTIFFS' BRIEF IN SUPPORT OF THEIR MOTION FOR CLASS
CERTIFICATION AND APPOINTMENT OF CLASS REPRESENTATIVES
AND CLASS COUNSEL**

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STATEMENT OF ISSUES PRESENTED

1. Should claims by purchasers of Class Vehicles with defective 8L transmissions from authorized GM dealers be certified as class actions for the states where the purchases were made pursuant to Federal Rules of Civil Procedure 23(a) and (b)(3) where the requirements of numerosity, commonality, typicality, and adequacy of representation are satisfied; common issues of law and fact predominate; and a class action is superior for the fair adjudication of the controversy?

2. Alternatively, should the common issues of whether the 8L transmission is defective, whether its defects are material, whether and when GM knew of the defects, whether GM was obligated to disclose the defects, and whether and by how much GM's misconduct inflated the price of the vehicles or caused a diminution in their value, or how much in an estimated cost of repairs would provide customers the benefit of their bargain be certified pursuant to Federal Rule of Civil Procedure 23(c)(4)?

3. Should the Court appoint Plaintiffs Michael Banks, Steven Brack, Jerry and Kim Carroll, Gary Clark, Troy and Kimberly Coulson, Darrin DeGrand, Daniel Drain, Daniel Dykshorn, John Ellard, Richard Filiaggi, Robert Higgins, Randall Jacobs, Brian Lloyd, Rhianna Meyers, James Norvell, Cary Sherrow, Donald Sicura, Joseph Sierchio, Jason Sinclair, Dennis Speerly, Richard Sullivan, Tait Thomas, Phillip Weeks, Maria Barallardos, James Paul Browne, Dominic Eatherton, Karina & William Fredo, Andre McQuade, Louis Ray, and David Thompson as Class Representatives for their respective states of purchase where their claims are typical of those of the Class members, and they are committed to vigorously prosecuting this litigation?

4. Should the Court appoint Theodore J. Leopold as Class Counsel where such counsel has extensive complex class action experience and will fairly and adequately represent the interests of the Classes?

Plaintiffs' answer: Yes.

TABLE OF MOST APPROPRIATE AUTHORITIES

Daffin v. Ford Motor Co., 458 F.3d 549 (6th Cir. 2006).

Rikos v. Procter & Gamble Co., 799 F.3d 497 (6th Cir. 2015).

In re Whirlpool Corp. Front-Loading Washer Prods. Liab. Litig., 722 F.3d 838 (6th Cir. 2013).

In re Am. Med. Sys., Inc., 75 F.3d 1069 (6th Cir. 1996).

In re FCA US LLC Monostable Elec. Gearshift Litig., 334 F.R.D. 96 (E.D. Mich. 2019)

Fed. R. Civ. P. 23

I. INTRODUCTION

GM's 8L transmissions are defective and create a safety risk for hundreds of thousands of consumers. Vehicles with these transmissions – specifically 8L90 and 8L45, which GM's Expert explains have common architecture and “component differences . . . primarily related to size,” Tab 1. Lange Rept. ¶87 – suffer from two problems. First, a defective automatic transmission fluid led to a “shudder” or vibration in higher gears. Second, a poor transmission design causes harsh shifts in lower gears, felt as jerking, lurching, and hesitations. GM has known about these problems even before it began selling 8L vehicles in 2014, and warranty claims for the vehicles are well above GM's targets.

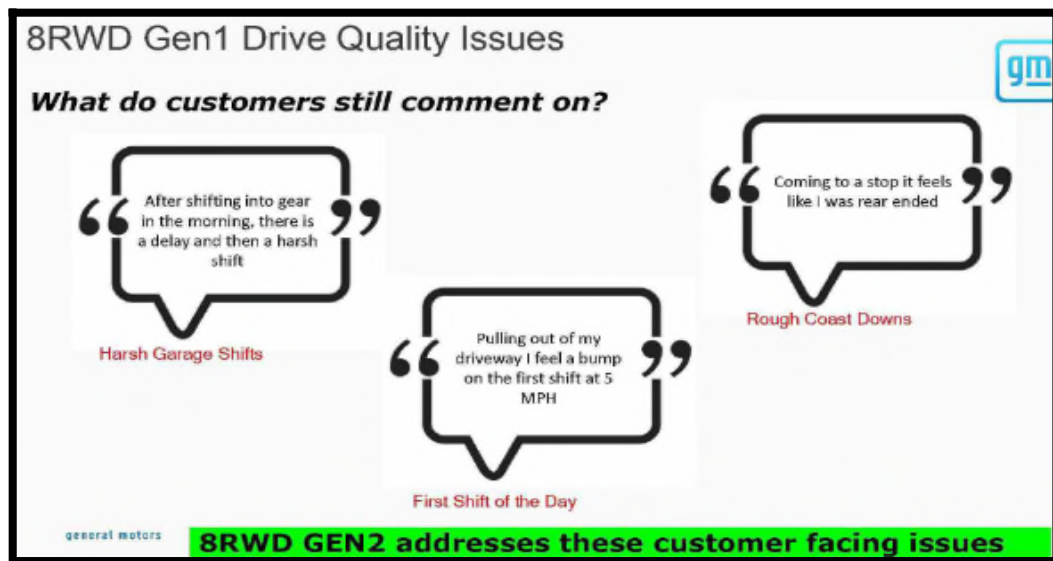
Plaintiffs seek to certify classes of original and used purchasers of vehicles with the 8L transmission in model years (“MY”) 2015 to 2019 (“Class Vehicles”). Further GM acted the same to all putative class members by selling them vehicles with these material common defects and hiding what it knew. All class members suffered the same economic harm, as estimated through the inflated market price, the cost to repair the defects, or the diminished resale value. Resolving plaintiffs' claims on a classwide basis is superior to hundreds of thousands of individual trials. Plaintiffs therefore seek class certification of the 26 state classes under Rule 23(b)(3), or alternatively certification of common issues under Rule 23(c)(4), and appointment of Class Representatives and Class Counsel.

II. FACTS COMMON TO ALL MEMBERS OF THE CLASSES

A. **The 8L Transmissions Suffer Common Shudder and Shift Quality Issues Many Times Higher than GM’s Own Targets**

The 8L “Shudder Defect” is a vibration akin to driving over rumble strips. ECF No. 177-3, PX121 at 1. The Shudder Defect results from GM’s patented automatic transmission fluids (ATF) designed exclusively for use in 8Ls (212b and Option B). The ATFs lack a [REDACTED], and an inability to [REDACTED]. *Id.* In March 2019, GM switched the 8Ls to a new ATF (Mod1a) virtually eliminating shudder. *Id.* at 12. But GM rejected a field action to replace the defective ATFs in previously sold Class Vehicles. Tab 2, PX182 at 1.

The 8L vehicles also have ongoing drive quality problems related to shifting:



ECF No. 209-7, PageID.12936. These “first shift of the day,” “garage shift,” and “rough coast downs,” (The Shift Quality Defect”) result from an [REDACTED]

[REDACTED]. ECF No. 177-6, PX153 at

1. Correcting this requires a “major redesign”:

Essence of Learning: Lessons learned were compiled, and incremental fixes both hardware and calibration were introduced between MY16-MY20 to improve warranty and customer satisfaction. Ultimately, some of the issues could not be resolved without a major redesign of the transmission, which was approved in early 2018 (8RWD Gen 2).

ECF No. 173-5, PageID.5934. The redesign, among other things, [REDACTED]

[REDACTED]. Tab 3, Keenan Dep. 116:1-120:20; 182:20-183:25.

However, GM’s Gen 2 redesign will not be implemented until MY23; and will not be implemented in Class Vehicles. ECF No. 210-7, PX123 at 6-7. To retrospectively redress the Shift Defect (and reduce buybacks and warranty claims), GM weighed in 2020 service proposals for Class Vehicles, including \$1550 for a valve body replacement or \$4450 for transmission replacement, ECF No. 179-2, (“Eichmann Rept.”) ¶ 57, but abandoned them. ECF No. 204-13, PX225 at 1; ECF No. 206-13, PX323 at 2; Keenan Dep. 116:1-120:20; 182:20-183:25.

To understand the breadth of the Defects, GM’s own targets for transmission claims for Class Vehicles were between [REDACTED] to [REDACTED] IPTV (incidents per thousand), or about [REDACTED]% to [REDACTED]%. ECF No. 182-1 (“Wachs Rept.”) ¶ 26; Tab 4, Gonzales Dep. at 196:4-197:10. The Class Vehicles exceeded these targets in short order. Wachs Rept. ¶ 81. A February 2018 GM analysis predicted [REDACTED] IPTV at 60,000 miles with [REDACTED]

repeat claims. Tab 5, PX96; Tab 6, Burgman Dep. 171:7-172:18. The actual rate by August 2018 was worse—25% at 32 months. Tab 7, PX570 at 54; Tab 8, Scheich Dep. 213:6-214:4. In 2019, the IPTV for the Class Vehicles was **30 times** worse than the goal for the redesigned Gen 2. Tab 9, Page Dep. 98:9-99:24. Engineer Tim Anguish recalled warranty claims for 8L shudder reaching 50%. Tab 10, Anguish Dep. 173:20-174:10. Engineer Max Burgman saw warranty claims drop 10-fold after Mod1a. Tab 11, PX122; Burgman Dep. 47:23-48:12, 233:6-234:17.

GM safety investigations also confirm the Shudder and Shift Quality Defects. GM employees repeatedly created Open Investigation Reviews (“OIRs”) collecting complaints and data to present to GM executives. The OIR process would classify the frequency [REDACTED] of a problem, along with its “[REDACTED]” and “[REDACTED]”. ECF No. 174-7, PX285 at 44-46. A [REDACTED] rating meant incidents or repairs per thousand vehicles (IPTV or RPTV) exceed [REDACTED]. *Id.* at 44. [REDACTED] *Id.* For the Shudder Defect, the rating was [REDACTED]. *Id.*; ECF No. 177-3, PX121 at 1. A June 2021 OIR for the Shift Quality Defect (lunge/lurch/hesitation) had an [REDACTED] ECF No. 177-6, PX153 at 1. Using repairs per thousand vehicles, Robert Lange, **GM’s own expert**, compared Class Vehicles with 8L transmissions (M5U & M5X) to the same models with other transmissions. He found the Class Vehicles’ RPTVs on shift

quality claims to be many multiples worse – as high as 90 times worse 109 to 1.2:

TRANSMISSION TYPE	MSU	MSX	MYC	MYD (MY 2015 NOT 2014)	MF6 (MY 2018 NOT 2016)	MW7 (MY 2015 NOT 2014)
MY 2014 @ 12 MIS	ABOUT 25 RPTV	ABOUT 35 RPTV	LESS THAN 3 RPTV	LESS THAN 1.2 RPTV	NA	LESS THAN 5 RPTV
MY 2014 @ 24 MIS	ABOUT 50 RPTV	ABOUT 65 RPTV	LESS THAN 3 RPTV	LESS THAN 1.2 RPTV	NA	LESS THAN 5 RPTV
MY 2014 @ 36 MIS	ABOUT 65 RPTV	ABOUT 100 RPTV	LESS THAN 3 RPTV	LESS THAN 1.2 RPTV	NA	LESS THAN 5 RPTV
MY 2014 @ 48 MIS	ABOUT 80 RPTV	ABOUT 109 RPTV	LESS THAN 3 RPTV	LESS THAN 1.2 RPTV	NA	LESS THAN 5 RPTV
MY 2014 @ 60 MIS	ABOUT 82 RPTV	NA	LESS THAN 3 RPTV	LESS THAN 1.2 RPTV	NA	LESS THAN 5 RPTV
MY 2016 @ 12 MIS	ABOUT 10 RPTV	ABOUT 10 RPTV	LESS THAN 3 RPTV	LESS THAN 2 RPTV	LESS THAN 5 RPTV	LESS THAN 5 RPTV
MY 2016 @ 24 MIS	ABOUT 20 RPTV	ABOUT 20 RPTV	LESS THAN 3 RPTV	LESS THAN 2 RPTV	ABOUT 6 RPTV	LESS THAN 5 RPTV
MY 2016 @ 36 MIS	ABOUT 31 RPTV	ABOUT 31 RPTV	LESS THAN 3 RPTV	LESS THAN 2 RPTV	NA	LESS THAN 5 RPTV
MY 2016 @ 48 MIS	ABOUT 35 RPTV	ABOUT 35 RPTV	LESS THAN 3 RPTV	ABOUT 2 RPTV	NA	LESS THAN 5 RPTV
MY 2016 @ 60 MIS	NA	ABOUT RPTV	LESS THAN 3 RPTV	NA	NA	NA

Table 3. Selected 8LXX Harsh Shift Complaint Rates By Model and MY.

Lange Rept. at 105; Tab 12, Lange Dep. 224:12-229:13. A GM cost recovery specialist testified that GM’s \$ [REDACTED] warranty spend on 8L was the largest he’d seen. Tab 13, Bloink Dep. 44:9-45:18; 77:15-24; Tab 14, PX190 at 2. Chief Engineer Clyde Bulloch confirmed “the shudder and the shift quality as not meeting ... the warranty targets that [GM] aspire[s] to achieve.” Tab 15, Bulloch Dep. 191:1-10.

Plaintiffs’ expert Dr. Allise Wachs concurred that the Class Vehicles exceeded GM’s targets. ECF No. 182-1, Wachs Rept. ¶¶ 84–85. Her reliability analyses predicted 61–100% warranty claims in Class Vehicles due to the Defects within 10 years. *Id.* ¶ 74. GM views vehicle life expectancy as 10 years or 120,000 miles. Tab 16, Eichmann Dep. Ex. 7 at 3; *accord* ECF No. 180-1, (“McVea Rept.”) at 6. Wachs’ 10-year projections corresponded with GM’s own analysis. *Id.* ¶ 77.

Plaintiffs’ expert Dr. William McVea inspected the Plaintiffs’ vehicles, reviewed GM documents and depositions, and dissected 8L transmissions. McVea Rept. ¶ 10. He opined that the Shudder and Shift Quality Defects are common to

Class Vehicles as well as the Plaintiffs' vehicles. *Id.* ¶¶ 32-35, 64-72.

B. GM Knew of the 8L Design Defects Before Launch

1. GM Concealed the Shudder Defect

Even before the first 8L reached a customer, GM engineers complained of shudder. Page Dep. 126:1-25. A June 2013 email noted that “the shudder is terrible” in the 8L Corvette, and GM engineers were not seeing the “positive friction slope [they] were expecting[.]” Tab 17, PX196 at 1; Keenan Dep. 66:2-68:3, 77:6-78:23. Immediately, the engineers suspected the “flat/negative friction slope” the ATF formed with the friction material. Tab 18, PX284. By July 2013, they attributed the shudder to “an interaction of TCC friction material characteristics and 212B trans fluid.” Tab 19, PX102 at 2. By September, it was diagnosed as “classic slip/stick [shudder] and not just a transient event”. Tab 20, PX58 at 1-3. Rather than redesign the friction system, GM calibrated around the Shudder Defect while engineers continued to examine upgrading the fluid or the friction material to resolve it. Tab 21, PX70 at 1; Tab 22, Melanson Dep. at 220:14-224:5.

GM sold the first 8L vehicle in Fall 2014 and by Fall 2015, warranty claims spiked. Tab 23, PX230. Soon “**8spd shudder [was] the #1 warranty issue in the company.**” Tab 24, PX231 at 1. GM began weekly and sometimes daily meetings on 8L shudder. Tab 25, Radecki Dep. 66:10-67:15; Melanson Dep. 151:1-153:8.

By February 1, 2016, GM's “8 Speed Team continue[d] with a ‘Code Red’

call on a daily basis where all 2016 warranty claims [were] reviewed.” Tab 26, GM000025867 at 3. GM’s Chief Engineer fretted, “[shudder] is going to below [*sic*] up real soon we have to work around the clock” to solve it. Tab 27, PX76 at 1; Tab 28, Goodrich Dep. 154:20-157:25. He was afraid to discuss shudder on online forums, noting, “what do we tell them? Bad oil? Bad friction? Bad integration? We are opening a can of worm [*sic*].” Tab 29, PX77 at 1. GM instead posted that customers should not worry about shudder if they had not yet experienced it. Tab 30, PX78. GM knew driving with the Shudder Defect can glaze and permanently damage the clutch material. Radecki Dep. 25:23-27:2, 62:22-63:25, 192:16-193:25; PX570 at 15. In a 2017 post GM wrongly claimed it had eliminated shudder. Tab 31, PX84; Goodrich Dep. 220:19-221:21.

GM also knew the ATF in pre-March 2019 Class Vehicles (212b and Option B) was sensitive to water. Afton, an ATF supplier, told GM this in May 2016. Tab 32, PX234. By July, Afton shared a “working theory that ester . . . is hydrolyzing,” leading to a loss of friction modifiers. Tab 33, PX237 at 1. GM engineers like Peter Radecki experimented by adding water at the 1,000 ppm GM specification and saw shudder. Burgman Dep. 90:13-94:3. Within a year of switching to Option B, warranty claims for Class Vehicles returned to the 212B levels. Tab 34, PX568. Radecki found warranty claims for 2015 Class Vehicles at 22% in 2017, 35% by 2018, and 56% by 2019. ECF No. 178-13, PageID.7754–55. This was not ordinary:

Q. ... a IPTV here of 346 [in 2018], that would have been an order of magnitude higher than the target IPTV, as far as you know?

A. I would say two orders of magnitude higher ... And --and this is -- keep in mind, this is not even end of warranty period. This is not a projection for end of warranty. This is actual claims that we've had so far, and it's raw math on the actual rate we're in. Not a projection[.]

Radecki Dep. 207:13 to 208:4. While he found shudder claims highest in humid areas, Dr. Wachs found the cumulative claim rates exceeded GM's targets everywhere. Wachs Rept. ¶117.

So "Why didn't Option B validation/verification catch water sensitivity?"

Tab 35, PX179 at 4-5 (emphasis in original). GM used duty cycles inconsistent with ordinary drivers. Bulloch Dep. 115:1-118:16; Radecki Dep. 330:3-331:23. Plus GM's water specification was twice as big as Ford's limit. Radecki Dep. 134:15-135:10. And GM did not perform additional water testing suggested by Radecki. *Id.* 149:9-151:2. But GM's Randy Melanson (Tab 36, PX108 at 3) conceded *that even without moisture*, the marginal friction system with 212b doomed the 8L to shudder:

Max and Peter, I think you're both right. And I'm not just handing out participation trophies here. On 8-speed, original 212B does not need water to shudder, it will do that very nicely on its own, thanks to insufficient friction modifiers designed into the additive package. If we had a sealed trans and no water contamination, we would still see shudder developing at ~ 20-40k miles, and eventually they'd all pop, given enough time. Since our trans is not sealed, water simply accelerates the friction curve degradation depending on how much and how fast net accumulation occurs. In summary, it's the combination of a poorly designed FM package and PAO fluid sensitivity to water (from high ester levels) that is behind the huge shudder IPTV we're seeing in 2015-2017 MY's.

Yet GM did not disclose this to customers. Its technical service bulletins (TSBs) never revealed the root cause of the Shudder Defect. Radecki Dep. 232:16-237:1. Mark Gordon, a GM Brand Quality Manager, tried to calm dealers dealing

with irate customers. He knew warranty claims were “out of control” and no fix for shudder was coming until some point in 2019. Tab 37, PX35. Meanwhile, GM employees like Assistant Chief Engineer Bill Goodrich appeared at auto shows to brag about 8L transmission performance in Class Vehicles without disclosing the Defects or the crushing warranty rates. Goodrich Dep. 228:6-232:22.

2. GM Concealed the Shift Quality Defect

Even before launching the Corvette in 2014, GM test drivers called the downshift to 1st gear a “neck snapper.” Tab 38, PX134 at 1. Others noted a “3 second delay ...flare, and a quick harsh engagement which causes the vehicle to lurch.” Tab 39, PX202 at 1. GM engineer Joe Page knew about harsh shifts affecting drive quality during development and preproduction. Page Dep. 80:15-85:18. These (along with first shift of the day, shudder, and lunges) were among the top five “issue buckets” in May 2014. *Id.* 278:15-280:23. The Chief Engineer for Corvette even considered a stop of production. Tab 40, PX195.

In 2015, customers surveyed by J.D. Power voiced that the Class Vehicles suffered from “poor drive quality” (i.e., shift quality). Tab 41, PX25 at 3. GM knew that the 2016 and 2017 Class Vehicles would not meet “benchmarking levels.” Tab 42, GM000043487 at 2. A GM engineer who worked on calibration admitted that his group should have informed management sooner about the shift quality defect in Class Vehicles. Tab 43, PX194 at 1 (“Just sayin, we did not help ourselves when the

opportunity was there. Of course nobody knew how had [*sic*] this POS was going to be, but blame can be assigned like a B24 bombing raid.”).

Even Robert Lange, GM’s expert, says GM launched the Class Vehicles without meeting its targets. Lange Rept. ¶ 87; Lange Dep. 180:20–181:2. Even after launch, the *8L failed to meet its targets every year*. From 2015 to 2019, the 8L program was at “yellow” (concerned) or “red” (not confident: targets not met) due to harsh shifts or shudder. ECF No. 177-7, PX223; Keenan Dep. 240:6-257:21.

GM considered and rejected retrospective improvements for MY15-MY17 models as it would require a transmission replacement. Tab 44, PX212 at 1. Mark Gordon lamented in February 2019 that “shift quality issues are an ongoing concern with the 8 Speed transmission. Unfortunately these issues have been through an Op-ex and a service solution is not going to be developed due to cost.” Tab 45, PX39. A year later, Gordon repeated that “unfortunately” shift quality complaints in Class Vehicles continued to increase and would only stop once the Gen 2 redesign was completed – information he warned was “(GM Confidential).” ECF No. 206-16, PX220 at 1; Keenan Dep. 210:1-211:12.

C. The Common Defects are Material and Present a Safety Issue

GM knows customers find the Shudder Defect and Shift Quality Defect unacceptable. Keenan Dep. 208:12-209:11. In addition to creating a poor driving experience, the Defects create a safety risk. Dealers complained that “vehicles . . .

with an eight speed transmission are dangerous when started because they lurch or jump.” ECF No. 178-13, PageID.7781-7782. Plaintiffs’ engineering expert agreed that “the hard shift / lurch issue may manifest itself during an attempt by the driver to pull-out into traffic.” ECF No. 178-13, PageID.7780–81. A GM Field Service Engineer testified that transmissions slamming into gear was a safety risk. ECF No. 202-18, PageID.11320-33, 11348-50. GM employees instigated Investigative Reviews regarding the Shudder Defect and Shift Quality Defect. ECF No. 174-4, DX578 at 1-7. This includes that harsh shifts can create a “starling effect [*sic*].” ECF No. 178-13, PageID.7782; Tab 46, PX147. A June 2021 investigation found the surging associated with the Shift Quality Defect supported an [REDACTED] score, [REDACTED] [REDACTED]. PX153 at 18; ECF No. 174-3, Hartfelder Dep. at 197:11-14. In a September 2021 investigation into 8L shudder, GM raised the [REDACTED] concern to a [REDACTED] out of [REDACTED]. ECF No. 174-7, PX285 at 1.

D. The Plaintiffs’ Experiences

Original Purchasers: The following named Plaintiffs move to serve as Class Representatives for original purchasers in the state where they bought a Class Vehicle from an authorized GM dealer: Michael Banks (NH), Steven Brack (NC), Jerry and Kim Carroll (WA), Gary Clark (KS), Troy and Kimberly Coulson (MN), Darrin DeGrand (TX), Daniel Drain (CO), Daniel Dykshorn (LA), John Ellard (OK), Richard Filiaggi (DE), Robert Higgins (ME), Randall Jacobs (NJ), Brian Lloyd

(AL), Rhianna Meyers (FL), James Norvell (KY), Cary Sherrow (ID), Donald Sicura (SC), Joseph Sierchio (NJ), Jason Sinclair (SC), Dennis Speerly (IL), Richard Sullivan (FL), Tait Thomas (FL), and Phillip Weeks (GA).

Used Purchasers/Current Owners: The following current owners bought used Class Vehicles from GM authorized dealers and seek to serve as Class Representatives for the used purchasers/current owners class for their respective states: Maria Barallardos (AZ), James Paul Browne (AR), Dominic Eatherton (WI), Karina and William Fredo (PA), Andre McQuade (NY), Louis Ray (MI), and David Thompson (TN).

All Plaintiffs bought MY15-MY19 GM vehicles with 8L transmissions, and testified to attempted repairs for shudder, harsh shifts, or both. Tab 47, Banks Dep. 71:14–73:3 (harsh shift); Tab 48, Barallardos Dep. 171:17–172:23 (both); Tab 49, Brack Dep. 96:9–19 (harsh shift); Tab 50, Browne Dep. 129:22–130:7 (shudder); Tab 51, K. Carroll Dep. 34:7–40:15, 46:12–48:18 & Tab 52, J. Carroll Dep. 71:7–82:5 (harsh shift); Tab 53, Clark Dep. 106:18–107:9 (shudder); Tab 54, T. Coulson Dep. 99:9–116:21 & Tab 55, K. Coulson Dep. 33:2–6, 49:4–7, 59:16–66:12 (harsh shift); Tab 56, DeGrand Dep. 89:2–105:24 (both); Tab 57, Drain Dep. 181:18–187:3 (both); Tab 58, Dykshorn Dep. 89:12–103:11 (both); Tab 59, Eatherton Dep. 107:10–108:5, 113:1–17 (harsh shift); Tab 60, Ellard Dep. 103:23–111:14 (harsh shift); Tab 61, K. Fredo Dep. 81:7–89:12 & Tab 62, W. Fredo Dep. 73:8–79:11

(both); Tab 63, Filiaggi Dep. 72:3–73:18, 216:4–217:3 (both); Tab 64, Higgins Dep. 90:19–105:24 (both); Tab 65, Jacobs Dep. 72:22–101:1–3 (both); Tab 66, Lloyd Dep. 93:24–106:19 (both); Tab 67, McQuade Dep. 141:4–143:23 (both); Tab 68, Meyers Dep. 150:16–8 (both); Tab 69, Norvell Dep. 125:11–126:2 (both); Tab 70, Ray Dep. 35:2–42:24 (both); Tab 71, Sherrow Dep. 124:12–125:10, 160:3–16 (both); Tab 72, Sicura Dep. 113:10–141:14 (both); Tab 73, Sierchio Dep. 103:12–119:11 (both); Tab 74, Sinclair Dep. 34:14–39:22 (both); Tab 75, Speerly Dep. 94:25–108:19 (both); Tab 76, Sullivan Dep. 142:1–144:12. (both); Tab 77, Thomas Dep. 85:1–90:8, 120:12–18 (both); Tab 78, Thompson Dep. 112:5–114:12 (both); Tab 79, Weeks Dep. 59:4–22 (harsh shifts). In addition, service work for the Shudder of Shift Quality Defects is reflected in Dr. Wachs’ report. ECF No. 175-3, ¶¶ 17(E), 121–27; ECF No. 200-3, Wachs Rept. Ex. E, PageID.10497–98.

Furthermore, all Plaintiffs testified that they would not have purchased their Class Vehicle if GM had disclosed the Defects. Banks Dep. 62:21–23; Barallardos Dep. 163:5–11; Brack Dep. 79:12–80:8; Browne Dep. 45:22–46:4; K. Carroll Dep. 28:18–21, 45:5–12 & J. Carroll Dep. 100:9–101:15; Clark Dep. 231:6–232:24; T. Coulson Dep. 74:18–20 & K. Colson Dep. 34:23–35:5, 96:22–97:8; DeGrand Dep. 75:17–20; Drain Dep. 160:23–161:11; Dykshorn Dep. 69:3–18; Eatherton Dep. 89:18–22; Ellard Dep. 84:13–85:1; K. Fredo Dep. 119:1–19 & W. Fredo Dep. 148:8–149:7; Filiaggi Dep. 157:1–158:6; Higgins Dep. 62:15–63:7; Jacobs Dep.

104:7–106:9; Lloyd Dep. 80:2–83:22; McQuade Dep. 129:18–22; Meyers Dep. 218:9–229:21; Norvell Dep. 231:10–19; Ray Dep. 127:12–18; Sherrow Dep. 98:21–23; Sicura Dep. 84:16–19, 89:3–10, 92:15–95:7, 113:4–6; Sierchio Dep. 70:3–71:3; Sinclair Dep. 43:12–44:12; Speerly Dep. 124:1–6; Sullivan Dep. 118:7–18; Thomas Dep. 254:7–255:6; Thompson Dep. 80:13–22; Weeks Dep. 148:7–23.

Each Plaintiff understands the role of a class representative. Banks Dep. 130:5–131:20; Barallardos Dep. 230:11–23; Brack Dep. 184:9–186:24; Browne Dep. 178:15–179:18, 184:18–185:1; K. Carroll Dep. 57:20–60:23 & J. Carroll Dep. 110:11–23; Clark Dep. 259:3–23; T. Coulson Dep. 31:25–32:23, 167:9–168:7 & K. Coulson Dep. 82:9–84:20; DeGrand Dep. 138:23–140:20; Drain Dep. 267:7–19; Dykshorn Dep. 137:16–138:4; Eatherton Dep. 165:16–19, 168:3–8; Ellard Dep. 200:5–12; Filiaggi Dep. 242:20–248:21; K. Fredo Dep. 122:8–17 & W. Fredo Dep. 131:24–132:19, 138:5–139:13; Higgins Dep. 117:4–25; Jacobs Dep. 141:6–11, 150:11–23; Lloyd Dep. 188:20–189:6; McQuade Dep. 245:15–247:5; Meyers Dep. 207:1–208:3; Norvell Dep. 202:15–18, 233:9–234:6; Ray Dep. 113:16–21; Sherrow Dep. 202:20–203:1; Sicura 190:20–192:18; Sierchio Dep. 158:23–159:4; Sinclair Dep. 173:12–17, 177:22–178:8; Speerly Dep. 150:23–151:24; Sullivan Dep. 46:21–47:2, 220:19–223:17; Thomas Dep. 178:4–185:20, 248:17–253:22; Thompson Dep. 171:10–21, 174:20–175:1; Weeks Dep. 81:4–8, 88:4–10, 91:16–19, 142:16–143:12, 236:6–21, 239:24–243:12.

Class members all suffered economic damages as demonstrated by economist Richard Eichmann of NERA. He devised three damage models for the consumers who bought Class Vehicles: 1) an overpayment damages model that uses input from conjoint surveys of each Class Vehicle segment conducted by Plaintiffs' expert Dr. Samantha Iyengar, to calculate the reduced market price for Class Vehicles if GM had disclosed the Defects at the point of a new purchase; 2) a cost of repair model that uses the service proposals GM considered to address the Shudder Defect and the Shift Quality Defect to calculate point of purchase overpayment damages whether an original or used purchaser; and 3) a diminution of value model, centered on a regression analysis Eichmann performed to calculate how much the Defects have reduced the value of the Class Vehicles for original purchasers. Eichmann Rept. ¶¶ 38-51. Class members who already received the Mod1a fluid flush would have \$309 deducted from their damages award. *Id.* at 29 n.146. The overcharge and diminution of value models are not available to the Used Purchasers. Tab 80, Eichmann Dep. 230:9-231:8.

E. Class Definitions

All buyers who purchased in [State of purchase] new Class Vehicles from authorized GM dealers before March 1, 2019

All used purchasers/current owners who purchased in [State of purchase] Class Vehicles from authorized GM dealers before March 1, 2019

The Class Vehicles include: 2015-2019 Chevrolet Silverado; 2017-2019

Chevrolet Colorado; 2015-2019 Chevrolet Corvette; 2016-2019 Chevrolet Camaro; 2015-2017 Cadillac Escalade and Escalade ESV; 2016-2018 Cadillac CT6; 2016-2019 Cadillac CTS; 2015-2019 GMC Sierra; 2015-2017 Yukon and Yukon XL; and 2017-2019 GMC Canyon. Eichmann Rept at 9 n.30. The Classes end at March 1, 2019, as that is the acknowledged date when GM switched to using Mod1a as its ATF in 8L vehicles. Lange Rept. at 165 n.334.

III. LEGAL STANDARD

To certify a class under Rule 23(a), the movant must demonstrate numerosity, commonality, typicality, and adequacy. Fed. R. Civ. P. 23(a). Certification of a class under Rule 23(b)(3) further requires that Plaintiffs show that “questions of law or fact common to class members predominate over any questions affecting only individual members, and that a class action is superior to other available methods for fairly and efficiently adjudicating the controversy.” “If the same evidence will suffice for each member to make a prima facie showing, then it becomes a common question.” *Sandusky Wellness Ctr., LLC v. ASD Specialty Healthcare, Inc.*, 863 F.3d 460, 468 (6th Cir. 2017). The court conducts a “rigorous analysis” to determine whether the prerequisites of Rule 23 are met. *In re Whirlpool Corp. Front-Loading Washer Prods. Liab. Litig.*, 722 F.3d 838, 851 (6th Cir. 2013). But the court has “substantial discretion in determining whether to certify a class, as it possesses the inherent power to manage and control its own pending litigation.” *Sandusky*

Wellness Ctr., 863 F.3d at 466 (citation omitted).

IV. ARGUMENT

A. Plaintiffs Meet the Prerequisites of Rule 23(a).

1. The Classes Are So Numerous that Joinder Is Impracticable.

GM sales of the Class Vehicles exceed 1,000 in each of the 26 states at issue. ECF No. 206-2, Eichmann Rept. Sched. 36a. This easily meets the numerosity requirement. *In re Am. Med. Sys., Inc.*, 75 F.3d 1069, 1076 (6th Cir. 1996).

2. The Design Defects and GM's Conduct Demonstrate Commonality.

Rule 23(a)(2) requires “a common question that will yield a common answer for the class (to be resolved later at the merits stage), and that that common answer relates to the actual theory of liability in the case.” *Rikos v. Procter & Gamble Co.*, 799 F.3d 497, 505 (6th Cir. 2015). “[E]ven a single common question will do.” *Wal-Mart Stores, Inc. vs. Dukes*, 564 U.S. 338, 359 (2011) (internal citation omitted). Here, the most important common factual questions are: 1) whether the Defects exist in the Class Vehicles, 2) whether the Defects are material, 3) whether and when GM knew about the Defects, 4) whether GM concealed the Defects, and 5) the aggregate economic harm the concealed Defects caused purchasers.

3. Plaintiffs' Claims Are Typical of the Classes.

In this case, “the claims or defenses of the representative parties are typical of the claims or defenses of the class” Fed. R. Civ. P. 23(a)(3). Each named Plaintiff is typical of Class members because “her car has the same defect[] as the other class

members.” *Daffin v. Ford Motor Co.*, 458 F.3d 549, 552 (6th Cir. 2006). Whether or not the Defects manifest in a warranty claim does not defeat typicality. *Id.* at 553.

4. Plaintiffs and Counsel Are Adequate.

Per Rule 23(a)(4), Plaintiffs must (i) have common interests with the class and (ii) vigorously prosecute the interests of the class through qualified counsel. *See Young v. Nationwide Mut. Ins. Co.*, 693 F.3d 532, 543 (6th Cir. 2012). “[O]nly when attacks on the credibility of [Plaintiffs] are so sharp as to jeopardize the interests of [the Class] should such attacks render [them] inadequate.” *Vassalle v. Midland Funding LLC*, 708 F.3d 747, 757 (6th Cir. 2013). Class representatives are adequate if their interests are not “antagonistic to those of the Class.” *See In re Delphi Corp. Sec., Derivative & “ERISA” Litig.*, 248 F.R.D. 483, 494 (E.D. Mich. 2008).

As shown above, the Proposed Class Representatives understand their role in a class action, and none have interests antagonistic to the class. Proposed Class Counsel has decades of experience in class actions and complex litigation, *Theodore J. Leopold*, Cohen Milstein, <https://www.cohenmilstein.com/professional/theodore-j-leopold> (last visited Feb. 2, 2022), and has already been appointed by the Court as interim lead counsel. ECF No. 40, PageID.2230.

5. The Members of the Proposed Classes are Readily Ascertainable.

Rule 23(a) implicitly requires that membership in the proposed class be ascertainable. *Cole v. City of Memphis*, 839 F.3d 530, 541 (6th Cir. 2016). Here, the

proposed Classes consist of new or used purchasers of Class Vehicles from authorized GM dealerships in the home states of the named Plaintiffs. All are easily ascertainable through GM, class members and/or public records.

B. Certification Is Appropriate Under 23(b)(3).

1. Common Questions of Fact Predominate All Claims.

a. The 8Ls Have Universal Design Defects.

Plaintiffs allege all Class Vehicles contain two common design defects: the Shudder Defect and the Shift Quality Defect. ECF No. 178-13, PageID.7730. The question of whether these Defects exist in the Class Vehicles predominates, rendering 23(b)(3) certification appropriate. In *Daffin*, the plaintiffs brought express warranty claims based on an alleged defect in the class vehicles' throttle body. 458 F.3d at 552. The Sixth Circuit affirmed class certification finding as predominating common questions whether the throttle body assembly was defective, whether it reduced the value of the vehicles, and whether Ford's express warranty covered the latent defect. *Id.* Consistent with *Daffin*, Plaintiffs will use common, classwide evidence, including GM's documents, depositions, teardowns, and Plaintiffs' inspections, to show that these common Defects exist in the Class Vehicles at the point of sale. ECF No. 178-13, PageID.7735-7780.

Based on Lange's report, GM will likely argue changes in the 8L transmissions over the years, variances in warranty claims between model and model years, and geography, preclude class certification. But GM does not deny the

existence of the common Defects in the Class Vehicles. In fact, the replacement ATF (Mod1a) is GM's common fix for the Shudder Defect for all Class Vehicles, regardless of model, model year, trim, or vehicle location. ECF No. 200-15, PX314 (current TSB); Goodrich Dep. 128:18-129:16. Similarly, GM's service proposals to resolve the Shift Quality Defect grouped the Class Vehicles together with minimal differentiation, recommending [REDACTED]

[REDACTED]. ECF No. 206-13, PX323 at 2. Thus, the common defect question predominates. *Alger v. FCA US LLC*, 334 F.R.D. 415, 426 (E.D. Cal. 2020) (certifying auto defect claim where "the claims all stem from the same uniform defect that creates similar safety risks across all Class Vehicles and the same conduct of Chrysler related to the defect and customers of Class Vehicle").

Plus, variations in warranty levels are not material here. All Class Vehicles experience warranty claims in *orders of magnitude* above GM's own targets due to the Defects. Wachs Rept. ¶¶ 72, 84-85; Radecki Dep. 207:13-208:4; Lange Dep. 224:12-229:13. Differences in claims rates cannot show differences in kind between the Class Vehicles, only differences in degree, and that cannot defeat certification.

b. Common Evidence Shows GM Concealed the 8L Defects

As described above, common, classwide proof will be used to show that GM knew of the Shudder and Shift Quality Defects before it ever sold the Class Vehicles

but concealed them. *See* § II.B, *supra*, PX284; PX195; Keenan Dep. 240:6-257:21; Page Dep. 80:15-85:18. Due to the Defects, GM never met its quality targets for the Class Vehicles. PX223. From 2017 to 2021, the Defects prompted numerous investigative reviews that further informed GM of the problem. DX578 at 1-6; PX285; *see Quackenbush v. Am. Honda Motor Co.*, 2021 WL 6116949 at *5 (N.D. Cal. Dec. 27, 2021) (finding automobile company’s investigation of defect was classwide proof of its knowledge). Yet GM hid the Shudder Defect and misled customers about it. PX77; PX84; Goodrich Dep. 220:19-221:21. GM also concealed the Shift Quality Defect and misrepresented to consumers that poor shifts were “normal.” ECF No. 206-15, PX219 at 2. GM has kept the Gen 2 redesign set for 2023 to fix the Shift Quality Defect as “GM Confidential.” ECF No. 206-16, PX220 at 1. Questions regarding GM’s knowledge and concealment of the Defects predominate. *In re Whirlpool Corp.*, 722 F.3d at 859 (“[W]e uphold the district court’s determination that liability questions common to the Ohio class—whether the alleged design defects in the Duets proximately caused mold to grow in the machines and whether Whirlpool adequately warned consumers about the propensity for mold growth—predominate over any individual questions.”); *Wolin v. Jaguar Land Rover N. Am., LLC*, 617 F.3d 1168, 1173 (9th Cir. 2010) (finding that whether Land Rover was aware of and had a duty to disclose the defect and violated consumer protection laws were predominating common issues); *Parkinson*

v. Hyundai Motor Am., 258 F.R.D. 580, 596-97 (C.D. Cal. 2008) (finding defendant’s knowledge of a defective clutch system, whether it had a duty to disclose, and whether it did so to be predominating common issues).

c. Common Evidence Shows the Defects Are Material and Even Present a Safety Risk

A duty to disclose exists “when the defendant has exclusive knowledge of material facts not known or reasonably accessible to the plaintiff.” *See, e.g., Tait v. BSH Home Appliances Corp.*, 289 F.R.D. 466, 481 (C.D. Cal. 2012). The materiality of concealed information about a defect is evaluated “by considering common proofs, without involving the circumstances of any of the prospective class members’ individual transactions” because it is assessed using the objective reasonable consumer standard. *In re FCA US LLC Monostable Elec. Gearshift Litig.*, 334 F.R.D. 96, 115–17 (E.D. Mich. 2019) (collecting cases). Common evidence will show the Shudder Defect and Shift Quality Defect are material. Dr. Iyengar’s surveys showed that across seven segments, the Defects mattered to prospective customers. ECF No. 170-5, PageID.1608–09 (Iyengar Rept. ¶¶ 65–67). GM knew customers find the Defects unacceptable, Keenan Dep. 208:12-209:11, and that they complained about the Defects in Class Vehicles in surveys and online, PX77; PX25 at 3. Many customers spurned the Class Vehicles on the secondary market, costing GM residual value on post-lease sales; the Defects even hurt the reputation of models that did not even have the 8L. Page Dep. 289:2-292:14; ECF No. 205-14,

PageID.12200. Complaints made the Shudder Defect “#1 warranty issue in the company,” PX231 at 1. These Defects mattered to the reasonable consumer.

Even more, the Defects present a safety risk. Vehicles are unmerchantable when they are unsuitable for their ordinary or intended use – “not just to provide transportation but rather safe, reliable transportation.” *In re MyFord Touch Consumer Litig.*, 46 F. Supp. 3d 936, 980 (N.D. Cal. 2014). Whether class vehicles are suitable to provide safe, reliable transportation, whether they are unreasonably dangerous, and whether a reasonable consumer would have purchased or would have paid less for a Class Vehicle had the Defects been disclosed “all are objective inquiries susceptible to generalized, class-wide proof, on a common basis applicable to all class vehicles, without regard to the individual circumstances of the buyers.” *In re FCA Monostable*, 334 F.R.D. at 113 (internal quotation marks and citation omitted). There is also ample common evidence supporting the existence of safety risks associated with the common Defects. ECF No. 178-13, PageID.7780-84. Investigative Reviews in 2021 found the surging associated with the Shift Quality Defect created a safety issue, PX153 at 18, and increased the “██████” score to a ██████ out of ██████ for the Shudder Defect. PX285 at 1. This common evidence permits classwide determination of the materiality and safety implications of the Defects.

d. Common Evidence Shows GM’s Conduct Inflated the Purchase Price and Diminished the Value of the Vehicles

GM’s conduct caused economic injury that can be measured classwide. First,

Plaintiffs can show with common evidence that GM’s concealment and failure to disclose the Defects at the point of sale inflated the market price paid by all members of the Classes by an average of \$1,318. ECF No. 172-2, PageID.5727–32. Economist Richard Eichmann calculated the “but-for” market price by first using demand aggregates from conjoint analysis surveys designed and overseen by Dr. Samantha Iyengar. *Id.* Dr. Iyengar’s conjoint surveys evaluated “whether knowledge of allegedly defective 8-speed automatic transmissions would have impacted consumers’ likelihood of purchasing the Class Vehicles.” ECF No. 170-5, PageID.5584. She used as “service rates” the warranty claims rates associated with each of the seven Class Vehicle segments and found across all segments consumers were less likely to purchase a vehicle with the Defects. *Id.*, PageID.5609. Conjoint surveys like this have been repeatedly accepted to aid in determining an overcharge for an undisclosed auto defect. *See, e.g., Cardenas v. Toyota Motor Corp.*, 2021 WL 5811741, at *5 (S.D. Fla. Dec. 6, 2021); *In re FCA US LLC Monostable Elec. Gearshift Litig.*, 382 F. Supp. 3d 687, 699 (E.D. Mich. 2019); *Sanchez-Knutson v. Ford Motor Co.*, 310 F.R.D. 529, 539 (S.D. Fla. 2015).

Eichmann then ran a “market equilibrium” that incorporated data on market share and marginal costs to estimate what the “but for” price of the Class Vehicles would have been had GM disclosed the Defects. ECF No. 172-2, PageID.5728–31. His simulation yielded a series of price adjustments for each model and model year.

Id., PageID.11960, Schedule 29. Those amounts (on average \$1,318) would be awarded to each original purchaser of a Class Vehicle. ECF No. 205-3, PageID.12027. GM's deceptive conduct inflates prices, injuring all buyers regardless of individual preference or experience. *Carriuolo v. Gen. Motors Co.*, 823 F.3d 977, 986–87 (11th Cir. 2016). Determining how much GM's concealment of the Defects inflated the market price is a predominating common question.

Second, Plaintiffs can also show classwide evidence of common economic injury at the point of sale through a cost-of-repair model that serves as a proxy for the average overcharge paid at the time of purchase. ECF No. 172-2, PageID.5733–36. Under this model, Class members' damages are calculated based on the average cost necessary to make the vehicles conform to the value purchasers thought they were getting in the price tendered. *Falco v. Nissan N. Am. Inc.*, 2016 WL 1327474, at *12 (C.D. Cal. Apr. 5, 2016); *accord Nguyen v. Nissan N. Am., Inc.*, 932 F.3d 811, 821 (9th Cir. 2019). To estimate cost of repair for the Shudder Defect, Eichmann relied on GM's warranty data for the actual spends on Mod1a flushes—about \$309. ECF No. 172-2, PageID.5733. For the Shift Quality Defect, Eichmann used service proposals that GM considered that estimated \$1,250 for valve body replacements or \$4,550 for transmission replacements. Eichmann used the \$1,250 repair, calculating a \$1,559 cost-of-repair for both Defects. *Id.*; *Siqueiros, v. Gen. Motors LLC*, 2022 WL 74182, at *10 (N.D. Cal. Jan. 7, 2022) (finding expert can rely on defendant's

estimates). Similar models have been accepted in automotive cases. *See, e.g., Quackenbush*, 2021 WL 6116949, at *7; *Salas v. Toyota Motor Sales, U.S.A., Inc.*, 2019 WL 1940619, at *12 (C.D. Cal. Mar. 27, 2019).

Third, through common proof, Plaintiffs can show how all original Class Vehicle purchasers suffered diminution of value. Eichmann conducted a multivariate hedonic regression to evaluate the Class Vehicles' resale value over the expected depreciation. Eichmann Rept., PageID.5736-5737. Eichmann found a diminution in value across the 8Ls attributable to the Defects at \$1,316 per vehicle. PageID.5770. Courts have allowed similar analyses, including this Court. *In re FCA Monostable*, 382 F. Supp. 3d at 695-96. All three damages models proffered by Eichmann will be proved with common, classwide evidence and flow from Plaintiffs' theory of liability, consistent with *Comcast Corp. v. Behrend*, 569 U.S. 27, 35, 38 (2013).

2. Common Questions of Law Support Class Certification

Plaintiffs move to certify those state causes of action most amenable to class treatment as found by numerous courts. Plaintiffs eschewed claims where individual reliance, contractual privity, or notice might cause manageability problems. *See, e.g., In re Am. Med. Sys., Inc.*, 75 F.3d at 1085.

Illinois: ICFA, Fraudulent Concealment, Express and Implied Warranty. Illinois Consumer Fraud Act claims, 815 Ill. Comp. Stat. Ann. § 505/10a(a), and fraudulent concealment are appropriate for class certification because causation is

proven classwide through a showing of materiality. *Rikos*, 799 F.3d at 514–15; *Tershakovec v. Ford Motor Co.*, 2021 WL 2700347, at *19 (S.D. Fla. July 1, 2021); *Quackenbush*, 2021 WL 6116949, at *2–4, 6, 10. Warranty claims in Illinois follow the UCC. 810 Ill. Comp. Stat. § 5/2-313. Illinois has a privity requirement, but the exceptions of agency and third-party beneficiary apply to purchases from GM authorized dealers. §§ 5/2-314 and 5/2A-212; *Elward v. Electrolux Home Prods., Inc.*, 214 F. Supp. 3d 701, 705 (N.D. Ill. 2016). Regarding notice for express warranty, a significant number of Class members will have presented their Class Vehicle to a dealer and can be identified through GM’s warranty data and claims administration; this issue will not predominate over the common issues. *Tershakovec*, 2021 WL 2700347 at *19.

Florida: FDUTPA. To prevail under the Florida Deceptive and Unfair Trade Practices Act a plaintiff must prove (1) deceptive acts or practices, (2) actual injury, and (3) that the former caused the latter. Fla. Stat. § 501.204(1); *City First Mortg. Corp. v. Barton*, 988 So. 2d 82, 86 (Fla. Dist. Ct. App. 2008). “[A] deceptive practice is one that is likely to mislead consumers.” *In re Takata Airbag Prods. Liab. Litig.*, 2016 WL 6072406, at *11 (S.D. Fla. Oct. 14, 2016) (citation omitted). Reliance is not an element. *Carriuolo*, 823 F.3d at 986. Common issues predominate in FDUTPA cases concerning omissions about automotive defects. *Cardenas*, 2021 WL 5811741, at *12–13; *Sanchez-Knutson*, 310 F.R.D. at 536–39, 542. Damages

can be awarded under a price inflation theory. *Carriuolo*, 823 F.3d at 983.

Texas: TDTPA, Express Warranty. There are two relevant Texas Deceptive Trade Practices Act claims – one permitting suit for deceptive conduct, 17.50(a)(1). and one permitting suit for breach of express warranty, 17.50(a)(2). While the first provision requires the consumer to rely to his or her detriment, the second does not. *In re Lumber Liquidators*, 2017 WL 2646286, at *17 (E.D. Va. June 20, 2017). But even the first provision does not necessitate that “reliance or other elements of their causes of action cannot be proved class-wide with evidence generally applicable to all class members; class-wide proof is possible when class-wide evidence exists.” *Tershakovec*, 2021 WL 2700347, at *20 (certifying Texas DTPA class) (citing *Henry Schein, Inc. v. Stromboe*, 102 S.W.3d 675, 693 (Tex. 2002)); *In re ConAgra Foods, Inc.*, 90 F. Supp. 3d 919, 1018 (C.D. Cal. 2015) (holding plaintiffs’ DTPA was “susceptible of classwide proof if plaintiffs can show the materiality of . . . representation on a classwide basis.”). For breach of express warranty, Texas follows the UCC. Tex. Bus. & Com. Code § 2.313; *U.S. Tire-Tech, Inc. v. Boeran, B.V.*, 110 S.W.3d 194, 197–98 (Tex. Ct. App. 2003). Privity is not required. *Id.* at 198. And notice issues do not predominate common liability issues. *Steigerwald v. BHH, LLC*, 2016 WL 695424, at *9 (N.D. Ohio Feb. 22, 2016).

Alabama: ADTPA, Express Warranty. The Alabama Deceptive Trade Practices Act has the same three essential elements as does the FDUTPA. Ala. Code

§ 8-19-10. While the statute precludes class actions, that has not been an impediment to class certification under Rule 23. *Lisk v. Lumber One Wood Preserving, LLC*, 792 F.3d 1331, 1334 (11th Cir. 2015); *Suchanek v. Sturm Foods, Inc.*, 311 F.R.D. 239, 264 (S.D. Ill. 2015). Alabama follows the UCC for express warranty claims. Ala. Code §§ 7-2-313. These claims should be certified.

Arizona: ACFA. Under the Arizona Consumer Fraud Act an omission is actionable if it “is material and ‘made with intent that a consumer rely thereon.’” *In re Arizona Theranos, Inc., Litig.*, 308 F. Supp. 3d 1026, 1040 (D. Ariz. 2018) (citation omitted). Where plaintiffs’ theory is the fraud caused an inflated market price, the user’s individual experience is not relevant. *In re Arizona Theranos, Inc., Litig.*, 2020 WL 5435299, at *7 (D. Ariz. Mar. 6, 2020), *aff’d in part, rev’d in part and remanded sub nom. B.P. v. Balwani*, 2021 WL 4077008 (9th Cir. Sept. 8, 2021).

Arkansas: ADTPA and Implied Warranty. The Arkansas Deceptive Trade Practices Act, though it requires reliance, is suitable for class certification. Ark. Stat. § 4-88-107; *Murphy v. Gospel for Asia, Inc.*, 327 F.R.D. 227, 243–44 (W.D. Ark. 2018). Arkansas’ warranty statute follows the UCC and is also appropriate for certification. § 4-2-314; *In re Dial Complete Mktg. & Sales Pracs. Litig.*, 312 F.R.D. 36, 59–60 (D.N.H. 2015).

Colorado: Express and Implied Warranty. Express and implied warranty claims follow the UCC. Colo. Rev. Stat. §§ 4-2-313. Privity is not required. §§ 4-2-

314, 4-2.5-212; *Am. Safety Equip. Corp. v. Winkler*, 640 P.2d 216, 221 (Colo. 1982).

Class treatment is permissible. *Steigerwald*, 2016 WL 695424, at *9–10.

Delaware: DCFA, Express and Implied Warranty. Like the FDUTPA, the Delaware Consumer Fraud Act requires showing a deceptive or unfair practice or a material omission that causes harm. Del. Code Ann. tit. 6, §§ 2513, 2525; *see In re Pharma. Indus. Average Wholesale Price Litig.*, 252 F.R.D. 83, 97–99, 108–09 (D. Mass. 2008). Delaware warranty law follows the UCC. 6 Del. Code §§ 2-313. And warranty claims do not require privity. § 2-314; *Martin v. Ryder Truck Rental, Inc.*, 353 A.2d 581, 583 (Del. 1976).

Georgia: Express and Implied Warranty. Georgia follows the UCC regarding warranty claims. Ga. Code. Ann. § 11-2-313. While Georgia requires privity for the breach of implied warranty, there is a third-party beneficiary exception to this requirement. § 11-2-314; *Elward*, 214 F. Supp. 3d at 705 (citations omitted); *Mowbray v. Waste Mgmt. Holdings, Inc.*, 189 F.R.D. 194, 199, 202 (D. Mass. 1999), *aff'd* 208 F.3d 288 (1st Cir. 2000) (certifying Georgia warranty class).

Idaho: ICPA, Express Warranty. Idaho's Consumer Protection Act requires the same elements as the above consumer protection statutes, Idaho Code § 48-608(1), and is appropriate for class certification in an automotive defect case, *Siqueiros v. Gen. Motors LLC*, 2021 WL 2115400, at *25 (N.D. Cal. May 25, 2021), *on reconsideration*, 2021 WL 3291837, at *1–2 (N.D. Cal. Aug. 2, 2021) (limiting

class to purchasers from GM-authorized dealers). Its warranty law also tracks the UCC and is amenable to class certification. Idaho Code § 28-2-313.

Kansas: KCPA, Express and Implied Warranty. Kansas's Consumer Protection Act is substantively the same as Florida's, Kan. Stat. Ann. § 50-634(1), and is amenable to classwide adjudication in cases concerning omissions about automotive defects, *Alberin v. Am. Honda Motor Co.*, 2021 WL 1320773, at *1–2, 7–10, 18 (N.D. Cal. Mar. 23, 2021). So are Kansas warranty claims, as they follow the UCC and do not require privity. Kan. Stat. Ann. §§ 84-2-313, 84-2-314; *Golden v. Den-Mat Corp.*, 276 P.3d 773, 800 (Kan. App. 2012).

Kentucky: KCPA, Express Warranty. The Kentucky class should be certified. Its Consumer Protection Act mirrors that of Florida, Ky. Rev. Stat. Ann. § 367.220(1), and its warranty statute is based on the UCC. § 335.2-313; *see Brummett v. Skyline Corp.*, 1984 WL 262559, at *1, 4 (W.D. Ky. Apr. 11, 1984) (certifying CPA and warranty class).

Louisiana: LUTPA, Fraudulent Concealment. The Louisiana Unfair Trade Practices and Consumer Protection Law contains the same substantive provisions as other consumer protection statutes. La. Stat. Ann. § 51:1405. The fraudulent concealment claim, similar to that of Illinois, should also be certified. *Kadlec Med. Ctr. v. Lakeview Anesthesia Assocs.*, 527 F.3d 412, 418 (5th Cir. 2008).

Maine: MUTPA, Express and Implied Warranty. The Maine Unfair Trade

Practices Act makes an act or practice deceptive if it is a material omission that is likely to mislead consumers acting reasonably under the circumstances. Me. Rev. Stat. tit. 5, §§ 207, 213(1); *McGahey v. Fed. Nat’l Mortg. Ass’n*, 266 F. Supp. 3d 421, 435 (D. Me. 2017). Maine also follows the UCC on warranty. Me. Stat. Ann. tit. 11 §§ 2-313. Common questions predominate for express warranty claims. *Steigerwald*, 2016 WL 695424, at *9–10. For implied warranty, privity is not required, facilitating class treatment. *Ouellette v. Sturm, Ruger & Co.*, 466 A.2d 478, 482 (Me. 1983).

Michigan: MCPA and Implied Warranty. The Michigan Consumer Protection Act prohibits “[u]nfair, unconscionable, or deceptive methods, acts, or practices in the conduct of trade or commerce.” Mich. Comp. Laws § 445.903(1). Reliance is established by the reasonable person standard, and it is presumed when the defendant omits material information. *In re GM Air Conditioning Mktg. & Sales Practices Litig.*, 406 F. Supp. 3d 618, 634 (E.D. Mich. 2019). The implied warranty law does not require privity. § 440.2313; *Francis v. Gen. Motors, LLC*, 504 F. Supp. 3d 659, 677 (E.D. Mich. 2020). Mr. Ray’s Michigan claims should be certified.

Minnesota: MCFA, Express and Implied Warranty. The Minnesota Consumer Fraud Act requires (1) “fraud, false pretense, false promise, misrepresentation, misleading statement or deceptive practice,” (2) intent that others rely, (3) the case has a public benefit, (4) causation, and (5) damage. Minn. Stat. §

325F.69; *Grp. Health Plan, Inc. v. Philip Morris Inc.*, 621 N.W.2d 2, 12 (Minn. 2001). Reliance is not required to show causation. *Id.* at 15. A common course of conduct regarding a material falsehood can demonstrate the causal nexus. *Khoday v. Symantec Corp.*, 2014 WL 1281600, at *31 (D. Minn. Mar. 13, 2014). For warranty under Minnesota law, the notice bar is low, and defendant must show prejudice. Minn. Stat. §336.2-313; *Wyoming v. Procter & Gamble Co.*, 210 F. Supp. 3d 1137, 1157-58 (D. Minn. 2016). Privity is not a bar. §§ 336.2-314, 336.2A-212; *Minn. Mining & Mfg. Co. v. Nishika Ltd.*, 565 N.W.2d 16, 19 (Minn. 1997); *Steigerwald*, 2016 WL 695424, at *9–10 (finding predominance for express warranty).

New Hampshire: NHCPA, Express and Implied Warranty. Consumer fraud claims are appropriate for certification, and individual reliance is not required. N.H. Rev. Stat. Ann. §§ 358-A:2, 358-A:10(I); *Rikos*, 799 F.3d at 516. New Hampshire warranty law follows the UCC, §§ 382-A:2-313, -314, and for the implied warranty claim, privity is not required. *Dalton v. Stanley Solar & Stove, Inc.*, 629 A.2d 794, 797 (N.H. 1993). Common questions predominate for express warranty. *Steigerwald*, 2016 WL 695424, at *9–10.

New Jersey: NJCFA, Express and Implied Warranty. Material misrepresentation or deliberate omissions are actionable under the New Jersey Consumer Fraud Act. N.J. Stat. Ann. § 56:8–2. The absence of a reliance requirement permits class claims seeking the benefit of the bargain. *Dzielak v.*

Whirlpool Corp., 2017 WL 6513347, at *2, 21 (D.N.J. Dec. 20, 2017). For express warranty claims, common issues of defect and coverage predominate. § 12A:2-313; *Steigerwald*, 2016 WL 695424, at *9–10. For implied warranty, privity is not required, inviting class treatment. § 12A:2-314; *Spring Motors Distribs., Inc. v. Ford Motor Co.*, 489 A.2d 660, 663 (N.J. 1985).

New York: GBL § 349 and Fraudulent Concealment. New York’s consumer fraud statute, N.Y. Gen. Bus. Law § 349, does not require proof of individual reliance. *Pelman v. McDonald’s Corp.*, 396 F.3d 508, 511 (2d Cir. 2005). Rather, “[d]eceptive acts are defined objectively as acts likely to mislead a reasonable consumer acting reasonably under the circumstances.” *Spagnola v. Chubb Corp.*, 574 F.3d 64, 74 (2d Cir. 2009). *Tait*, 289 F.R.D. at 485 (certifying GBL and implied warranty claims for moldy washers because objective standard used and reliance not required). New York’s warranty law follows the UCC. N.Y. U.C.C. §§ 2-313, -314; *see Testone v. Barlean’s Organic Oils, LLC*, 2021 WL 4438391, at *2, 13–15, 19 (S.D. Cal. Sept. 28, 2021) (certifying express warranty claim). There is a third-party beneficiary exception to the privity requirement for implied warranty, *Praxair, Inc. v. Gen. Insulation Co.*, 611 F. Supp. 2d 318, 330 (W.D.N.Y. 2009), making these claims appropriate for class certification, *Tait*, 289 F.R.D. at 485.

North Carolina: NCUDPA. North Carolina’s Unfair and Deceptive Practices Act is largely identical to the FDUTPA. N.C. Gen. Stat. Ann. §§ 75-1.1, -16.

Reliance can be demonstrated classwide using circumstantial evidence of a common deceptive practice. *Rikos*, 799 F.3d at 517–18; *In re TD Bank, N.A. Debit Card Overdraft Fee Litig.*, 325 F.R.D. 136, 161 (D.S.C. 2018) (finding individual showing of reliance not needed where “there is substantial evidence that all class members were subjected to the same or similar putative misrepresentations or omissions, through the PDAA and other uniform disclosures, which allegedly prevented them from understanding how the Bank’s available balance practices caused them harm.”)

Oklahoma: OCPA, Express and Implied Warranty. Oklahoma’s Consumer Protection Act, Okla. Stat. tit. 15, § 751 *et seq.*, requires “(1) that the defendant engaged in an unlawful practice as defined at [Okla. Stat. tit. 15,] § 753; (2) that the challenged practice occurred in the course of defendant's business; (3) that the plaintiff, as a consumer, suffered an injury in fact; and (4) that the challenged practice caused the plaintiff's injury.” *Patterson v. Beall*, 19 P.3d 839, 846–47 (Okla. 2000). Oklahoma warranty law follows the UCC. Okla. Stat. tit. 12A, § 2-313. The first complaint here (*Francis*) satisfied notice. *Sisemore v. Dolgencorp, LLC*, 212 F. Supp.3d 1106, 1111 (N.D. Okla. May 11, 2016). Privity is not an issue, § 2-313; *Old Albany Ests., Ltd. v. Highland Carpet Mills, Inc.*, 604 P.2d 849, 851–52 (Okla. 1979), and class treatment is permissible, *Steigerwald*, 2016 WL 695424, at *9–10.

Pennsylvania: PUTPCPL, Express and Implied Warranty. While reliance is required for an unfair trade practice claim in Pennsylvania, it may be shown by

common proof where the fraud is based on uniform conduct. *Greene v. Sears Prot. Co.*, 2018 WL 3104300, at *8 (N.D. Ill. June 25, 2018). Plaintiffs allege that here. Pennsylvania's warranty laws follow the UCC. 13 Pa. C.S. § 2313 & 13 Pa. C.S. § 2314(b). Privity is not required. of implied warranties. *Montgomery Cty. v. MicroVote Corp.*, 152 F. Supp. 2d 784, 799 (E.D. Pa. 2001). Notice by some class members suffices to sustain a breach of warranty claim for a common defect. *Martin v. Ford Motor Co.*, 765 F. Supp. 2d 673, 682–83 (E.D. Pa. 2011), as does filing a complaint, *In re Ford E-350 Van Prods. Liab. Litig.*, 2010 WL 2813877, at *39-40 (D. N.J. July 9, 2010). The Fredos presented their vehicle for repair for shudder and shift quality repeatedly, as did the original owner. W. Fredo Dep. at 53:21-54:23. Their claims on behalf of similarly situated Pennsylvanians should be certified.

South Carolina: Express and Implied Warranty. For warranty claims, South Carolina follows the UCC. S.C. Code Ann. § 36-2-313. There is no privity issue. § 36-2-314; *Gasque v. Eagle Mach. Co.*, 243 S.E.2d 831, 832 (S.C. 1978). Warranty claims are amenable to class treatment. *Thomas v. Louisiana-Pac. Corp.*, 246 F.R.D. 505, 514 (D.S.C. 2007) (certifying express and implied warranty claims finding predominating questions whether exterior trim board is defective, whether defendant breached the warranty, and whether attorney's fees should be awarded).

Tennessee: TCPA, Fraudulent Concealment. The Tennessee Consumer Protection Act mirrors the FDUTPA and is appropriate for certification. Tenn. Code

Ann. § 47-18-101 *et seq.*; *Sharp v. Easy Money Title Pawn, Inc.*, 128 Fed. App'x 513 (6th Cir. 2005). The common facts support a deliberate concealment of material information, allowing for certification for fraudulent concealment. *Tershakovec*, 2021 WL 2700347, at *20.

Washington: WCPA, Express Warranty, Fraudulent Concealment. For a Consumer Protection Act claim, a plaintiff must prove: (1) an unfair or deceptive act or practice that (2) affects trade or commerce (3) impacts the public interest, and (4) the plaintiff sustained damage to business or property that was (5) caused by the unfair or deceptive act or practice. Wash. Rev. Code § 19.86.010 *et seq.*; *Keodalah v. Allstate Ins. Co.*, 449 P.3d 1040, 1047 (Wash. 2019). Reliance on material omissions can be presumed. *Tershakovec*, 2021 WL 2700347 at *20 (certifying fraud, warranty, and WCPA claims) (citing *Morris v. Int'l Yogurt Co.*, 729 P.2d 33 (Wash. 1986)); *see also Alberin*, 2021 WL 1320773, at *2, 7–10, 18 (certifying WCPA and fraudulent concealment claims in auto defect case). Washington's express warranty law follows the UCC. Wash. Rev. Code §§ 62a.2-313 and is amenable to class treatment. *Grays Harbor Adventist Christian Sch. v. Carrier Corp.*, 242 F.R.D. 568, 573 (W.D. Wash. 2007) (certifying warranty and WCPA claims against manufacturer, finding as predominating questions whether the furnaces were defective, what Carrier knew, and whether it had a duty to disclose).

Wisconsin: WDTPA. The Wisconsin Deceptive Trade Practices Act has the

same elements as the FDUTPA. Wis. Stat. § 100.18. For the same reasons, common issues predominate. *In re Dollar Gen. Motor Oil Mktg. & Sales Pracs. Litig.*, 2019 WL 1418292, at *27–30 (W.D. Mo. March 21, 2019).

3. The Classes Are Manageable and Class Treatment Is Superior.

Rule 23(b)(3) also asks the court to consider whether a class action is superior in light of the interests of the Class members, the extent of other ongoing litigation, the desirability of concentrating the litigation in a particular forum, and the manageability of the action. Only a few individual Lemon Law cases may exist. Meanwhile, this Court is GM’s home forum, closest to the witnesses. Those factors favor certification, as does superiority when considering “the difficulties of managing a class action [compared to] other means of disposing of the suit [as well as] the value of individual damage awards, as small awards weigh in favor of class suits.” *Pipefitters Local 636 Ins. Fund v. Blue Cross Blue Shield of Mich.*, 654 F.3d 618, 630–31 (6th Cir. 2011).

As to manageability, Plaintiffs propose three options in their Trial Plan. Tab 81. First, the Court could try just the common issues—the presence and scope of the Defects, GM’s knowledge and disclosures, and the economic harm the Defects caused. Second, the Court could try a few state Classes as bellwethers. Plaintiffs suggest Texas, Florida, and Illinois, which account for nearly ¼ of all U.S. purchases of the Class Vehicles. ECF No. 206-2 Eichmann Rept. Sched. 26. *See, e.g., In re*

Lumber Liquidators Chinese-Manufactured Flooring Prods. Mktg., Sales Pracs. & Prods. Liab. Litig., No. 15-cv-02765, ECF No. 22 at 2 (E.D. Va. Sept. 3, 2015) (including Texas, Florida, and Illinois as bellwethers due to size and sales); *Sloan*, 2020 WL 1955643, at *2 & n.1, *53 (approving bellwether class certification plan of four states).

Finally, the Court could try all 26 states together, and “each state’s law would determine a defendant’s liability for [Class Vehicle] purchases that occurred in that state.” *Dzielak*, 2017 WL 6513347, at *16. In *Rikos*, the district court saw no manageability problems in certifying a multistate consumer fraud case, noting, “The jury will therefore be instructed on, at most, five claims. The Court will provide to specific instructions to clarify the elements of these claims. *Rikos v. Procter & Gamble Co.*, 2014 WL 11370455, at *15 (S.D. Ohio June 19, 2014) *aff’d*, 799 F.3d 497 (6th Cir. 2015). *Benson v. Newell Brands, Inc.*, 2021 WL 5321510, at *10 (N.D. Ill. Nov. 16, 2021) (equating the ICFA to consumer protection laws including Florida, Minnesota New Jersey); *Steigerwald*, 2016 WL 695424, at *9–10 (noting similarity of express warranty elements in Colorado, Maine, Minnesota, New Hampshire, New Jersey, Oklahoma, and Texas); *Bank of Am. Home Affordable Modification Program (HAMP) Contract Litig.*, 2013 WL 4759649 at *9 (D. Mass. 2013) (certifying 26 classes under laws of 26 states). This Court has already noted that while there are differences in warranty laws, “those distinctions are largely

immaterial.” *Francis*, 504 F. Supp. 3d at 672. Special verdict forms or jury instructions could account for any minor state law variations.

C. Alternatively, The Court Should Certify an Issue Class.

If the Court deems a 23(b)(3) class is not viable, the Court should certify class-wide adjudication under Rule 23(c)(4) of the following issues: 1) whether the Defects exist in the Class Vehicles; 2) whether the Defects are material; 3) whether and when GM knew about the Defects; 4) whether GM concealed the Defects, and 5) the aggregate economic harm from the concealed Defects. Trying these common issues would materially advance the litigation and resolve the most expensive issues requiring experts. *Martin v. Behr Dayton Thermal Prods. LLC*, 896 F.3d 405, 416 (6th Cir. 2018); *In re Veolia N. Am., LLC*, No. 21-103 (6th Cir. Jan. 24, 2022). *In re FCA Monostable*, 334 F.R.D. at 110.

V. CONCLUSION

For the above reasons, Plaintiffs’ Motion should be granted.

February 7, 2022

Respectfully Submitted,

/s/ Theodore Leopold

Theodore J. Leopold

Cohen Milstein Sellers & Toll PLLC
2925 PGA Boulevard, Suite 200
Palm Beach Gardens, FL 33410
T: (561) 515-1400
Tleopold@cohenmilstein.com

Interim Lead Counsel for Plaintiffs

EXHIBIT 1



**Expert Report of
Robert C. Lange**

**Wesley Won, et al. v. GM
2105605.EX0**

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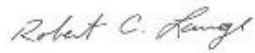
**Expert Report of
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**Wesley Won, et al. v. GM
2105605.EX0**

Prepared for

Paul Collier, Esq.
Kirkland & Ellis LLP
300 North LaSalle Street
Chicago, IL 60654

Prepared By:


Robert C. Lange

December 10, 2021

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149 Commonwealth Drive
Menlo Park, CA 94025

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Qualifications & Report Structure

Qualifications

1. My name is Robert Carl Lange; I am a Principal and Senior Fellow at Exponent, Inc., a technical and scientific consulting firm. I received Bachelor of Science and Master of Science degrees from the University of Michigan. My Curriculum Vitae is included as Attachment 1 hereto. My four-year testimony history is included as Attachment 2 hereto. My hourly rate is \$500 per hour, that will change to \$600 per hour on January 1, 2022. Exponent's fees and my compensation are not contingent upon any conclusion I reach, nor the outcome of this matter.
2. I have been retained by Kirkland & Ellis LLP to review case related documents and technical materials related to automatic transmission technology and motor vehicle safety; review reports and materials generated by Plaintiffs' experts; write a report, and provide testimony as necessary.
3. Prior to my employment with Exponent, I worked for the Ford Motor Company, Failure Analysis Associates (a technical consulting firm), and the General Motors Corporation (GM).
4. During my career I have been involved in: statistical analysis of motor vehicle service performance databases including warranty records; statistical forecasting and reliability analyses; Design of Experiments (DOE) with emphasis on design and analysis of computer experiments; stochastic modeling and Monte Carlo simulations; failure mode avoidance methods including Six Sigma

and Failure Mode and Effects Analysis (FMEA); motor vehicle safety; systems engineering (vehicle level performance criteria development and criteria distribution to systems and components, criteria development, and specification flow down to component level specifications); vehicle safety technology research, development, and implementation; motor vehicle collisions and public health; problem identification and resolution through product or process change; vehicle design, development, validation, and certification including powertrain selection and requirements; Noise, Vibration, and Harshness (NVH) engineering; development of common industry standards to address various systems requirements; advanced program engineering; advanced structures engineering and integration including NVH; supply chain development and management including: requirements specifications, Production Part Approval Process (PPAP) applications and implementation, reliability analyses, and quality controls; vehicle technology planning, research, design, development, validation, certification, and implementation; overall vehicle and safety integration; resolution of technical problems in vehicle integration; potential vehicle defect investigations; safety defect determinations, and recalls; emission control technology, certification and fuel economy including Corporate Average Fuel Economy (CAFE).

5. At Ford Motor Company I had the following positions and responsibilities: Design and Release Engineer, Supervisor of groups of Design Engineers, Technical Expert (Transmissions and controls), and Supervisor of a vehicle design section responsible for Vehicle Design Engineering.
 - a. As a Design Engineer and Supervisor, I was responsible for warranty analyses and improvement; problem identification, resolution, and validation; components and systems design,

release, development, function, fit, appearance, and validation including transmission controls; and remedy of multiple safety defects through recall actions.

- b. As the Supervisor for Vehicle Design Engineering, I was responsible for vehicle integration involving vehicle program definition, requirements setting and imperatives balancing; powertrain selection and analyses (including Noise, Vibrations, and Harshness); fuel economy and emissions performance; program management, including resource allocation, program scheduling, problem identification/tracking/resolution, underbody and powertrain system packaging (the placement and configuration of underbody components); competitive benchmarking research, measurement (including systems teardown), and assessment of like systems engineered by other vehicle manufacturers; management of the competitive vehicle fleet and emerging technology assessment; statistical analyses of manufacturing and service (warranty) data; vehicle certification to safety and emissions regulations; warranty improvements; and Corporate Average Fuel Economy (CAFE).
6. At Failure Analysis Associates I had the following positions: Managing Engineer, Principal Engineer, and Vice President. I provided technical consulting services in automotive engineering, automotive safety defect investigations, motor vehicle related public policy issues, and motor vehicle emissions.
7. In my assignment at GM, my title and job responsibilities changed over time; from 1994-2008 I was the Executive In Charge of Field Performance Analysis, Engineering Director of Vehicle Development, or Executive Director of Safety Integration. I was the Senior GM Executive responsible for motor vehicle safety technology research, development, and application. Among other responsibilities, these positions involved:

- a. systems engineering, requirements definition and requirements flow down from vehicle to systems to component levels;
- b. Corporate Average Fuel Economy (CAFE) including powertrain selection and fuel economy related technologies;
- c. statistical analyses of public health data for improvement opportunities and prioritization of those identified opportunities and research to identify potential safety countermeasures;
- d. advanced engineering for safety integration and structures including NVH for body vibrations and powertrain isolation;
- e. production development, validation and certification of new vehicle products, planning and execution of product programs and safety technologies across the product portfolio;
- f. “Safety Integration” including research, technology application, safety performance goals setting for new vehicle programs as they were authorized for production; establishment of safety requirements; and final approval of safety performance and technology content prior to production authorization;
- g. establishment of a database to collect, analyze, and issue “TREAD”¹ reports to the National Highway Traffic Safety Administration (NHTSA) as well.

8. Throughout my employment at GM, I supervised the “Product Investigations” Department. That department was responsible for:

¹ TREAD Act – “Transportation Recall Enhancement, Accountability and Documentation Act”, amendments made to section 30118 of title 49, United States Code, by section 364. The Act requires manufacturers to report defect findings made in foreign countries involving products like those in the US; “Early Warning” – collection and submission of certain warranty and claims data; and allegations of serious or fatal injury due to alleged defects. The Act provided for civil penalties for violation of provisions of the Safety Act and associated regulations and criminal penalty for intentional violation of TREAD reporting requirements. GM was the manufacturer selected to first test the NHTSA system for receipt of TREAD data.

- a. identification of potential safety defect issues and initiation of investigations regarding potential safety defect issues,
 - b. defining and implementing the defect investigation and decision-making process,
 - c. issue tracking and status reporting,
 - d. meeting scheduling for the Senior Management Committee to analyze investigations and recommend resolution actions,
 - e. preparation of technical reports to resolve every defect investigation, including: description of the issue, how the issue was discovered, warranty and failure rate data, failure analyses and unique considerations if any, competitive benchmarking, compliance to regulatory and commonly accepted industry standards, conformance to internal GM standards, assessment of the safety risk, possible corrective actions for remedy, validation of the remedy, application of the defect and remedy to North American and non-North American products (as appropriate), and institutional learnings from the investigation/resolution with consequent revisions to internal GM standards as necessary to correct identified systemic problems.
 - f. communications with the NHTSA regarding safety defect investigations including GM's responses to National Highway Traffic Safety Administration (NHTSA – the regulatory authority in the U.S.) Information Requests,
 - g. formal notice of defect determination sent to the NHTSA within five days of a defect determination, and quarterly reports of recall status.
9. The Product Investigations Department conducted annual training sessions for each of the GM Systems Engineering Groups (responsible for functional systems in the vehicle). The annual training sessions addressed: the legal framework that defined motor vehicle manufacturers' responsibilities for defect determinations and remedy, GM's defect investigation and

determination process, specific GM defect determinations of the prior year, individual and systemic failures in the Vehicle Development Process (VDP) that resulted in the recalls to remedy safety defects or noncompliance conditions, and the lessons GM engineers needed to apply to avoid similar VDP errors in the future. I was a faculty member that taught those training sessions. I also taught the global safety defect and remedy process to GM engineers in the Germany, Sweden, Australia, Japan, The Republic of China, Brazil, and South Korea.

10. I was a member of the GM “Senior Management Committee”. That committee was responsible for:
 - a. directing potential safety defect investigations;
 - b. scheduling reviews and status reports regarding open investigations;
 - c. consideration of all technical issues related to the issue including the engineering work necessary for implementation of a corrective action to remedy the defect and validation of the corrective action for defect remedy;
 - d. recommendations regarding defect determinations or alternative actions for every potential defect investigation.
11. “Senior Management Committee” investigations could result in recall for a safety defect, recall for non-compliance, recall for customer satisfaction (even if the performance deficiency or anomaly of the investigation was not a safety defect and/or did not present an unreasonable risk to motor vehicle safety); policy adjustments, warranty extensions, Technical Service Bulletins (TSBs); continued monitoring of customer experiences; or closure with no further actions. During my service period on the GM Senior Management Committee, we made recommendations for

defect findings and recalls in more than 250 investigations involving more than 44 million vehicles.

12. I have served as a Director of: The National Safety Council, Automotive Coalition for Traffic Safety (ACTS), the Crash Avoidance Metrics Partnership (CAMP), and the Vehicle Infrastructure Integration Consortium (VIIC). I have served as a member of: the Wayne State University Biomedical Department External Advisory Board, the Transportation Research Board Strategic Highway Research Plan 2 Implementation Report Committee, the University of Michigan Transportation Research Institute (UMTRI) external advisory board, the external advisory board of the International Center for Automotive Medicine (ICAM), as an engineering participant in ICAM case reviews at the University of Michigan Hospital, and as a committee member of the “Commission on Autonomous Vehicle Testing and Safety” (Securing America’s Future Energy, SAFE). I am a past chair of the Vehicle Systems Standards Committee of the Society of Automotive Engineers. I am a recipient of NHTSA’s award for Engineering Excellence in Automotive Safety.

Report Structure

13. This report is organized into eleven sections:
- a. Qualifications & Report Structure – this section.
 - b. Executive Summary – a brief summary of my findings and opinions in this matter.
 - c. Case background – a brief summary of the issues identified in Plaintiffs’ complaint and case related materials.
 - d. Motor Vehicle Safety and the Use of Consumer Complaints – a summary of the requirements imposed upon motor vehicle manufacturers under the Safety Act of 1966 and rules promulgated by the NHTSA to ensure motor vehicle safety in the United States.

- e. The Vehicle Development Process (VDP) and Defect Investigations.
 - f. Development of the GM 8L90 and 8L45 8 Speed Transmissions– a description of the basic architecture and design variations.
 - g. Analysis of the GM 8 Speed Transmission for Shift harshness – a brief review of information related to shift harshness on the subject transmissions.
 - h. Analysis of the GM 8 Speed Transmission for Shudder - a brief review of information related to transmission generated shudder on the subject transmissions.
 - i. Warranty Data Analysis – a summary of various transmission related warranty data related to the issues of shift harshness and shudder.
 - j. Safety Assessment – discussion and summary of data and information regarding the safety implications of shift harshness and shudder on the subject transmissions and the assessment made by Plaintiffs’ expert Dr. McVea.
 - k. Observations, Conclusions and Opinions
14. My analyses and opinions are based on research I have conducted on this project, case related information I have reviewed as of the date of this report, my education, work related training, and experience. My opinions are established to a reasonable level of engineering certainty. I will consider additional information as it becomes available and I may supplement this report based upon any additional work that I may conduct or supervise in review of, analysis of, or response to additional information I receive or review. The case materials I

have received are listed in Attachment 3 hereto. The references I have cited in this report are listed in Attachment 4 hereto.

Executive Summary

15. This lawsuit centers upon allegations that certain 8-speed automatic transmissions manufactured by General Motors, LLC (GM) and installed in 2015 – 2019 model year vehicles are defective, that the defect presents an unreasonable risk to motor vehicle safety, and that owners of vehicles equipped with the subject transmissions are therefore due consideration for the alleged defect.
 - a. There are two architectures for the subject transmissions: 8L90 and 8L45.
 - b. GM has produced technical materials that document: 1) GM's development of the transmissions; 2) design variations that have been engineered for certain sub-populations of the putative class; 3) safety defect reviews to determine if the transmissions present an unreasonable risk to motor vehicle safety; 4) engineering analyses related to problem identification, characterization, and resolution through design changes; and 5) warranty data that can be used to assess the degree to which various transmission designs presented different performance characteristics to vehicle owners.

16. Plaintiffs contend the GM 8LXX² transmission defects are shift harshness³ and shudder⁴. When manifest, both vehicle dynamic responses may be evaluated subjectively by vehicle occupants, who may have different sensitivities and predilections that influence different reactions and subjective assessments of acceptability. The two dynamic conditions can be objectively characterized by engineering measurements as well.
- a. Transmission gear shift dynamics are influenced by multiple engineering parameters including road load, engine speed, vehicle speed, the conditions of internal transmission components (e.g., transmission fluid, friction elements, shift solenoids), control programing, engine condition, and others.
 - b. Shudder can be caused by multiple powertrain or chassis conditions including tire and wheel balance, drive shaft balance, internal transmission dynamics, engine misfire, and others.
 - c. There is no single cause of shift harshness or shudder, and most vehicles in the putative class have not been presented seeking transmission service repair for either shift harshness or shudder.
 - d. Data and information form public sources, from GM's analyses, and from Exponent's research presents evidence that transmission performance and owner a complaint conditions are not in fact common across the putative class.

² "8LXX" is used when referring to both the 8L90 and 8L45 transmission architectures.

³ A transient discontinuity in accelerations that may be detected in the passenger compartment when the automatic transmission dynamically changes gear ratios in "Drive" mode (e.g. shifting from first-to-second), or upon start from a stop in "Drive" or "Reverse" ranges.

⁴ A vibrational condition may be detected in the passenger compartment when a powertrain or chassis component enters into an unstable dynamic range and oscillates until the excitation forces and damping forces equilibrate and balance. The condition may persist for some period.

17. Plaintiffs utilized various public sources of consumer complaints to support their allegations of defect. They referenced web-based chat fora, a consumer complaint database maintained by the U.S. National Highway Traffic Safety Administration , and technical service bulletins for transmission repair issued by GM. These source documents do not present similar performance complaints, and some are not related to transmissions at all. This material from public sources does not present evidence of transmission performance and owner a complaint conditions that are common across the putative class.
18. Review of the Named Plaintiffs' deposition transcripts and warranty records illustrates the variations in owner experiences with vehicles equipped with the subject transmissions.
 - a. Some Named Plaintiff owners have never presented their vehicle for transmission repair for either shift harshness or shudder; some presented their vehicles for such service on multiple occasions.
 - b. Some owners presented their vehicles for repair for shudder, shift harshness, clunk, hesitation on acceleration, surging on stop, stuck in first gear, differential noise, lurch forward on application of the accelerator, the vehicle was presented for service and no repair was affected as no problem was diagnosed, and grinding noise.
 - c. The operational conditions of which these Named Plaintiffs complained are not common and haven't a common cause. Named Plaintiffs' complaints of transmission malfunction vary and do not present evidence of transmission performance common across the putative class.

- d. No Named Plaintiffs reported a crash due to the alleged transmission defects.
19. Multiple GM employees were deposed in this matter. They discussed possible technical causes for the complaint conditions of harsh shift and shudder, GM's engineering investigations of the conditions and its responses by making design changes and taking various service actions, and safety defect investigations undertaken to consider the risk presented by the subject transmission conditions. They also testified the safety investigations were resolved in determinations that the operational conditions of harsh shift and shudder did not present an unreasonable risk to motor vehicle safety and were not safety related defects. GM employee testimony is reflective of the technical materials GM produced in this case regarding shift harshness investigations, shudder investigations, and safety defect investigations and their resolution.
20. Plaintiffs selected five subject transmissions for disassembly and inspection. The inspection population presented variations in internal sealing, wear, overheating, fluid leaks, transmission fluid condition, and evidence of prior service. The five inspected transmissions differ in evidence of use, wear, component condition, and repair status. The conditions were not common to the five samples and are illustrative of differences in use and performance. Based upon the transmissions Plaintiffs' expert selected for inspection, evidence of transmission use, wear, component condition, and repair status is not common across the putative class.

21. Exponent analyzed GM's warranty data produced in this case to assess whether vehicle performance deficiencies, malfunctions, problems or failures with the 8-speed transmission vehicles were common to the putative class.

- a. When considering motor vehicle performance deficiencies, problems, or failures from an engineering perspective; five analytical elements must be the same within the vehicle population of interest: 1) system design; 2) uniform symptomatic malfunction presented to the operator; 3) registration of a specific diagnostic fault code (where available); 4) causation by a specific component, system, control element, or interface; and 5) remedy by a common service repair that restores the vehicle to full functionality.
- b. If these analytical elements are not common, the warranty data cannot be used to prove a common defect across the population of interest.
- c. GM's warranty data enabled several analyses of these five elements. Exponent found that both conditions, shift harshness and shudder did not present to the dealers for repair with uniform symptomatic malfunctions; did not register a common diagnostic fault code, and did not associate with a common component as cause of the complaint nor were vehicles subject to a common repair remedy.
- d. Evidence of transmission design variations, different failure symptoms, different system fault codes, different causal components, and differing repair remedies for the

transmission shift harshness and TCC⁵ shudder malfunctions are not common to the putative class.

22. In considering all of the technical materials, case generated information, and analyses performed by GM and by Exponent regarding shift harshness and shudder problems with the putative class, I conclude that:
- a. there is no common transmission design applied across the putative class;
 - b. consumer complaints of various types of vehicle malfunctions and problems do not universally apply across the putative class and not all of those proffered by Plaintiffs even relate to the subject transmissions;
 - c. warranty analyses show substantial diversity of transmission performance as a function of vehicle model, model year, and geographic locale;
 - d. the subject transmissions do not present an unreasonable risk to motor vehicle safety.
 - e. This evidence does not present matters common to the putative class.

Case background

Plaintiffs' Allegations

23. The Consolidated Amended Class Action Complaint in the instant case is styled “Wesley Won, et al. Plaintiffs, v. General Motors, LLC, Defendant”; hereinafter the “Complaint”. In part, the “Complaint” claims:

⁵ TCC – Torque Converter Clutch, a component of automatic transmissions of the type at issue in this case.

- a. “This proposed class action is brought by new and used purchasers and lessees from across the United States who allege that GM concealed a known defect from its customers in the United States who purchased or leased any vehicle designed manufactured, marketed, distributed, sold, warranted and serviced by GM and equipped with GM’s Hydra-Matic 8L90 transmission or Hydra-Matic 8L45 transmission (collectively, “Class Vehicles”). The 8L90 and 8L45 transmissions are defective, posing serious safety concerns. These include: the 2015-2019 Chevrolet Silverado; the 2017-2019 Chevrolet Colorado; the 2015-2019 Chevrolet Corvette; the 2016-2019 Chevrolet Camaro; the 2015-2019 Cadillac Escalade and Escalade ESV; the 2016-2019 Cadillac ATS, ATS-V, CTS, CT6, and CTS-V; the 2015-2019 GMC Sierra, Yukon, and Yukon XL, and Yukon Denali XL; and the 2017-2019 GMC Canyon.”^{6 7}
- b. “As explained below, the Class Vehicles were sold with a defective 8L90 or 8L45 Transmissions that, among other things, slip, buck, kick, jerk and harshly engage, suffer abnormal internal wear, sudden acceleration, delay in downshifts, delayed acceleration, difficulty stopping the vehicle, and eventually require replacement of the transmission or its components (the “Transmission Defect”).”⁸

⁶ “Complaint” ¶ 2.

⁷ Plaintiff’s expert Dr. William Mark McVea describes the Class of vehicles he evaluated as “GM (General Motors, LLC) transmissions from MY2015 to MY2019 in vehicles that contain 8L product family of automatic transmissions” Dr. McVea evidently includes Chevrolet Express and GMC Savanah vehicles but these vehicles are not enumerated in the “Plaintiffs’ Complaint”.

⁸ “Complaint” at ¶ 4

- c. “This defect, which manifests itself within the limited warranty period or shortly after the limited warranty period expires, can cause unsafe conditions in the Class Vehicles, including but not limited vehicles suddenly lurching forward, sudden loss of forward propulsion, and significant delays in acceleration. These conditions present a safety hazard because they severely affect the driver’s ability to control the vehicle’s speed, acceleration, and deceleration.”⁹
- d. “GM expressly warranted the following: “The warranty covers repairs to correct any vehicle defect, not slight noise, vibrations, or other normal characteristics of the vehicle due to materials or workmanship occurring during the warranty period.” Accordingly, the warranty covers all defects except for “slight noise, vibrations, or other normal characteristics of the vehicle due to materials or workmanship occurring during the warranty period.” Because the Transmission Defect does not fall into any of the above excluded categories, it is covered under GM’s express warranty. However, when Class Members bring their vehicles to GM’s authorized agents for repair, they are either told that their vehicles are behaving normally, given ineffective repairs, or are having their transmissions or components replaced with the same defective parts.”¹⁰
- e. “In many instances, GM has never been able to repair the transmission. On information and belief, owners have complained of dangerous driving conditions and near-accidents because of the Transmission Defect...”¹¹
- f. Paragraphs 19 through 69 list the named Plaintiffs and their GM vehicle by model and model year.¹²

⁹ Ibid, at ¶ 5

¹⁰ Ibid, at ¶ 7

¹¹ Ibid, at ¶ 13.

¹² Ibid, at ¶¶ 19 – 69.

- g. “....In fact, the Transmission Defect in the 8L90 and 8L45 transmissions causes unsafe conditions, including, but not limited to, Class Vehicles suddenly lurching forward, sudden acceleration, delayed acceleration, and sudden loss of forward propulsion. These conditions present a safety hazard because they severely affect the driver’s ability to control the car’s speed, acceleration, and deceleration. As an example, these conditions may make it difficult to safely merge into traffic, and drivers have reported sudden lurching into intersections when attempting to gradually accelerate from a stopped position and other dangerous driving conditions. Even more troubling, the Transmission Defect can cause the vehicle to delay downshifting and decelerating when the brakes are depressed.”¹³
- h. The “Complaint” alleges GM “Technical Service Bulletins” (TSBs) are evidence of transmission defects.¹⁴
- i. The “Complaint” alleges consumer complaints registered with NHTSA¹⁵ provide notice to GM of transmission defects.¹⁶
- j. The “Complaint” alleges online consumer complaint fora provide notice of a transmission defect to GM.¹⁷
- k. “Plaintiffs’ Experiences” are listed.¹⁸

¹³ Ibid, at ¶¶ 97

¹⁴ Ibid, at ¶¶ 105 – 164.

¹⁵ NHTSA maintains a database of all safety-related defect complaints received by NHTSA since January 1, 1995, available through the NHTSA website at <http://www-odi.nhtsa.dot.gov/downloads/flatfiles.cfm>. The complaints are generated from consumers’ completion of a form, the “Vehicle Owner Questionnaire” (VOQ); VOQs are registered based upon complainants’ statements, are not reviewed for accuracy or completeness, and generally do not reflect technical considerations as to possible cause.

¹⁶ Ibid, at ¶¶ 165 – 304.

¹⁷ Ibid, at ¶¶ 306 – 350.

¹⁸ Ibid, at ¶¶ 355 – 901.

Named Plaintiffs' Experiences

24. Of the 36 vehicles at issue owned by Named Plaintiffs, 34 have at least one recorded repair service claim based on GM's warranty records. These service records demonstrate significant variation in terms of the nature of the complaints, the repair service performed, and the labor codes employed. The records are indicative of varied experiences among the Named Plaintiffs. Neither Plaintiffs nor their experts will be able to offer evidence to the Court regarding owners' use, service, and repair experiences that is common to the Putative Class. A summary of Named Plaintiffs' warranty claims is provided in Appendix 1 hereto. The summary shows:

- a. Two of the Named Plaintiffs had no transmission warranty repairs. Of the balance, there were between 1 and 9 warranty repair claims. There are a total of 112 repair claims distributed across the 36 remaining Named Plaintiffs.
- b. At least 1 service labor code was applied to each repair; 18 unique labor codes appeared in the 112 repair unique claims.
- c. There is significant variation among the "customer complaints" reported in the warranty claim narratives. For example:
 - i. "Customer states while driving at highway speeds when rpms are at about 1500 and speed is 65 + mph there is a violent shudderfeltlike drivin g [sic] off the road"
 - ii. "Customer states when in reverse acts like slipping into nuetral [sic] and giving gas jumps in gear, does this going forward as verynoticeable [sic] delay"
 - iii. "Customer states shifting 1st into second, or when in low gear, vehicle shifts very hard"
 - iv. "Customer states check engine light is on. Check and advise"
 - v. "Customer states vehicle has vibration at 45 mph."
 - vi. "Transmission Noise"

- vii. “Truck is shifting hard on first take off”
- d. There is significant variation among the “causal comments” reported in the warranty claim narratives. For example:
 - i. “Transmission [sic] banging-update available for condition”
 - ii. “Internal failure of torque converter”
 - iii. “Trans fluid contaminated”
 - iv. “No problem found”
 - v. “Road tested and noted a torque converter shudder at highway speeds as described in 18-NA-355.”
 - vi. “Excessive torque converter slip speed.”
 - vii. “Test drove vehicle and felt no shudder out of the ordinary ... No fault and no codes”
- e. There was significant variation in the “corrective action” narrative elements of the warranty claims. For example:
 - i. “Reprogrammed TCM for hard shift
wcc=11c52LABOR CODE: 2810175 0.5”
 - ii. “Per bulletin# 18-na-355 flushed drained transmission fluids”
 - iii. “Filled torque converter and replaced the torque converter. Test drove.”
 - iv. “Exchanged transmission fluid as per document described”
 - v. “Could not replicate customer concern. Labor operation 8469959 0.3”
 - vi. “Double flush transmission”
 - vii. “Unable to recommend a repair as the transmission is working as designed at this time.”

Named Plaintiffs’ Deposition Testimony

25. I have reviewed the named Plaintiffs’ depositions and they describe a variety of experiences. Individual summaries of the deposition transcripts of selected Named Plaintiffs are in Appendix 2 attached hereto.

26. Review of this collection of named Plaintiffs' testimony is illustrative of the diversity of the conditions presented in the putative class. The Named Plaintiffs themselves reported:
- a. Shudder – Mr. Brown¹⁹, Mr. Fredo²⁰, and Mr. Lloyd²¹.
 - b. Shift harshness – Mr. Ellard²², Mr. Fredo²³, Mr. Higgins²⁴, and Mr. Lloyd²⁵.
 - c. Clunk – Mr. Fredo²⁶.
 - d. Hesitation on acceleration – Mr. Fredo²⁷ and Mr. Lloyd²⁸.
 - e. Surging on stop – Mr. Higgins²⁹.
 - f. Stuck in first gear (Limp-home) - Mr. Higgins³⁰.
 - g. Differential noise – Mr. Jacobs³¹.
 - h. Lurch forward on application of the accelerator - Mr. Jacobs.³²
 - i. Vehicle was presented for service and no repair was affected as no problem was diagnosed – Mr. Browne³³, Mr. Ellard³⁴, Mr. Fredo³⁵, Mr. Higgins³⁶, Mr. Jacobs³⁷, and Mr. Lloyd³⁸.

¹⁹ Mr. James Paul Browne deposition transcript, August 19, 2021, at page 95.

²⁰ Mr. William Fredo deposition transcript, August 17, 2021, at pages 73-74.

²¹ Mr. Brian Lloyd deposition transcript, September 23, 2021, at pages 102-103.

²² Mr. Jon Ellard deposition transcript, August 25, 2021, at pages 107-111.

²³ Mr. William Fredo deposition transcript, August 17, 2021, at pages 75-79.

²⁴ Mr. Robert Higgins deposition transcript, August 20, 2021, at pages 93-94.

²⁵ Mr. Brian Lloyd deposition transcript, September 23, 2021, at pages 91-91 & 121-122.

²⁶ Mr. William Fredo deposition transcript, August 17, 2021, at pages 76-79.

²⁷ Ibid, at pages 90-92.

²⁸ Mr. Brian Lloyd deposition transcript, September 23, 2021, at pages 121-123

²⁹ Mr. Robert Higgins deposition transcript, August 20, 2021, at pages 90-91.

³⁰ Ibid, at page 91.

³¹ Mr. Randall Jacobs deposition transcript, September 29, 2021, at page 57.

³² Ibid, at pages 57 & 61-62.

³³ Mr. James Paul Browne deposition transcript, August 19, 2021, at page 95.

³⁴ Mr. Jon Ellard deposition transcript, August 25, 2021, at page 94.

³⁵ Mr. William Fredo deposition transcript, August 17, 2021, at pages 109-112 & 124.

³⁶ Mr. Robert Higgins deposition transcript, August 20, 2021, at pages 92 – 97.

³⁷ Ibid, at pages 61-63.

³⁸ Mr. Brian Lloyd deposition transcript, September 23, 2021, at pages 165-167.

j. Grinding noise – Mr. Jacobs³⁹.

27. Various noises were reported absent a connection to the claims of harsh shift and shudder made in the “Plaintiffs’ Complaint”. Motor vehicles are complex consumer products constructed of dozens of systems and thousands of components. Mechanical systems sometimes generate some noise at some frequency. Consumers receive and react to different audible stimuli differently. These particular noise complaints could all be dissociated from the complaint conditions of transmission shudder and shift harshness. Neither Plaintiffs nor their experts will likely be able to proffer evidence of noise complaints common to the putative class indicative of a transmission defect(s) related to motor vehicle safety.

28. Hesitation on accelerator application may be due to multiple potential causes; e.g. fuel contamination, fuel filter restriction, pinched or kinked fuel delivery line, engine mis-fire, spark plug fouling, powertrain control module malfunction, sensor malfunctions, throttle sticking, electrical power failure, electrical wiring harness compromise, and other causes. Neither Plaintiffs nor their experts will be able to provide the Court with evidence causally connecting hesitation on acceleration conditions to claimed defects in the 8L transmissions common to the putative class.

29. Surging during a stop was characterized by GM engineers in the context of harsh shifts on the 8L transmission. See ¶ 151 *infra*

³⁹ Ibid, at pages 73-81.

for details of the technical analysis of the phenomena as GM understands it.

- a. The “surge” is a discontinuity in the vehicle deceleration pulse that temporarily modestly increases the deceleration value for a period less than one-half second. The vehicle does not accelerate as is an attribute of a “surge”; the term “surge” is a misnomer but has attached to the phenomena consequent to consumer complaints that register its use.
- b. There are no adverse vehicle performance characteristics (other than complaints from some customers of a subjective dislike of the “driveability”⁴⁰ of the vehicle.)
- c. There is no loss of vehicle function consequent to the dynamic response of the vehicle in affecting the shift among gear ranges.
- d. See also ¶¶ 87 – 105 “Development of the GM 8L90 and 8L45 8 Speed Transmissions”, ¶¶ 123 – 128 “Warranty Data Analysis”, and ¶¶ 129 – 142 “Harsh Shift Claims Analysis”.
- e. Evidence regarding Plaintiffs’ objections to the 8L transmissions’ operational characteristics and whether or not such characteristics are unreasonably objectionable, is not common to the putative class.
- f. Such characteristics do not present an unreasonable risk to motor vehicle safety and the subject 8L transmissions are not defective warranting a recall.

⁴⁰ “Driveability” – a term of art in automotive engineering that encompasses all vehicle dynamic conditions as perceived by vehicle occupants that result from: environmental inputs (air flow, roadway, precipitation, and temperature) conditions, vehicle inputs (structures, powertrain, seat, ventilation, closures – doors and windows, tires and wheels), and driver control inputs (accelerator, brake, and steering) while the vehicle is being operated.

30. Absent technical diagnoses, it is not possible to definitively characterize the condition “stuck in first gear”. However, there are multiple potential causes including: engine control module failure, sensor failure, transmission valve body failure, application of a “limp-home”⁴¹ function, and others. Neither Plaintiffs nor their experts will be able to provide the Court with evidence causally connecting a condition of “stuck-in-first-gear” to claimed defects in the 8L transmissions common to the putative class or to any explicit cause.

31. A vehicle response as described by Mr. Jacobs - lurching forward on application of the accelerator - is a normal vehicle function; vehicles are supposed to move forward (if in a drive range) when the accelerator is applied. This performance is not a defect. From his deposition testimony, it is not possible to characterize the specific dynamic response characteristics to which Mr. Jacob’s objects. Vehicle response to throttle application is a complex function of driver input, powertrain friction, tire static coefficient of friction, local surface geometry at the tires, and multiple powertrain characteristics. Neither Plaintiffs nor their experts will be able to provide the Court with evidence causally connecting forward movement on throttle application to claimed defects in the 8L transmissions common to the putative class.

⁴¹ “Limp-home” – a feature engineered into most modern motor vehicles with electronic controls to provide safe function in the event of a significant system failure such as an erroneous command for wide-open-throttle. The “limp-home” feature overrides the erroneous command and reverts to a restricted operational range to enable drivers to safely deliver the vehicle to a service facility for repair. “Limp-home” is not a defect, it is a deliberately engineered safety solution to specific system failures that may present an unreasonable risk to motor vehicle safety or other performance difficulties.

32. Consider the condition “vehicle was presented for service and no repair was affected as no problem was diagnosed”. This condition may be prevalent to many members of the putative class as there are subjective elements in assessing both transmission shift characteristics and vehicle high speed vibrations. Additionally, there are multiple potential causes for high-speed vibration reported as “shudder”; e.g., tire imbalance, wheel imbalance, tire/wheel alignment, powertrain balance, engine misfire, exhaust resonance, among other causes. There are multiple causal elements related to the harsh shift conditions as well.

- a. These two complaint conditions are more fully discussed at ¶¶ 49 – 0 “Use of Consumer Complaints in Defect Investigations”, ¶¶ 87 – 105 “Development of the GM 8L90 and 8L45 8 Speed Transmissions”, ¶¶ 123 – 128 “Warranty Data Analysis”, ¶¶ 129 – 142 “Harsh Shift Claims Analysis”, and ¶¶ 143 – 150 “Shudder Claims Analysis” *infra*.
- b. Neither Plaintiffs nor their experts will be able to provide the Court with evidence of 8L transmissions’ harsh shift characteristics or shudder characteristics common to the putative class.

GM Employee Witness Testimony

33. Among others, GM employees Mr. Maxim Burgman, Mr. Robert Gonzales, Mr. Bill Goodrich, Mr. Andrew Scheich, Ms. Michelle Yeagley, Mr. Peter Radecki, and Mr. David Hartfelder were deposed in this matter. Summaries of the deposition transcripts for these individuals are reported in Appendix 3.

34. In reading and assessing the testimony of GM's employee witnesses, the following conclusions may be reached:
- a. There are multiple potential types of "shudder" vibration in vehicle drivetrains, not all related to water contamination of the ATF. Shudder can be a vehicle integration issue, calibration, or other cause.⁴²
 - b. In the subject transmissions, GM determined shudder is caused by an incompatibility between ATF friction properties at the clutch face and torque converter clutch (TCC) slip speed. If the ATF causes the clutch coefficient of friction to decrease with increasing slip speed, the friction system in the clutch becomes unstable and can vibrate; the vibrations in the clutch are presented to vehicle occupants as unanticipated and undesirable vibrations.⁴³
 - c. The original production release ATF was known as "212B", and it was replaced by an ATF called "OptionB" that was engineered with superior friction properties but was still susceptible to friction deterioration with increasing moisture content.⁴⁴
 - d. "OptionB" ATF was replaced with "Mod1a" ATF (beginning December 2018 – January 2019) that had stable friction properties with water contamination, and it corrected the 8L TCC shudder problem.⁴⁵

⁴² Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 100-120, 136-145, and 192; Deposition of Dr. Peter Radecki, August 27, 2021 at pages 30-32; and Deposition of Dr. Peter Radecki, August 27, 2021 at pages 142-144.

⁴³ Mr. Maxim Burgman deposition transcript, May 27, 2021, p 38-45, and Deposition of Mr. Robert Gonzales, April 4, 2021, pages 21-23.

⁴⁴ Deposition of Mr. Robert Gonzales, April 4, 2021, page 187 and Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 33-41.

⁴⁵ Mr. Maxim Burgman deposition transcript, May 27, 2021, p 45, Deposition of Mr. Robert Gonzales, April 4, 2021, page 67, Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 186-190, and Mr. Andrew Scheich deposition transcript, April 8, 2021, at page 99.

- e. The harsh shift problem in 8L transmissions is unrelated to the torque converter clutch shudder and ATF water contamination problem.⁴⁶
- f. TCC Shudder will not cause an engine to stall as the torque converter clutch is open when the vehicle is stopped.⁴⁷
- g. TCC Shudder develops over time and is geographically specific to high humidity locales.⁴⁸
- h. Technical Service Bulletin 18NA355 applied to all 8L transmissions.⁴⁹
- i. Harsh shift problems were addressed with continuous improvements, hardware and software, some in production changes and some through service bulletins.⁵⁰
- j. The VDP identified shudder problems and those were corrected prior to production.⁵¹
- k. TSB 19NA355 converted shudder repairs for all 8L transmissions to ATF change, issued March 2019.⁵²
- l. GM assessed safety risks for the 8L transmissions prior to production and during production. GM had objective measures for safety metrics related to vehicle unintended deceleration and acceleration.⁵³
- m. The GM “Speak Up For Safety” (SUFS) process initiated multiple reviews of the 8L transmissions;⁵⁴ none of which

⁴⁶ Deposition of Mr. Robert Gonzales, April 4, 2021, pages 190—191 and Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 105-107.

⁴⁷ Deposition of Mr. Robert Gonzales, April 4, 2021, page 263-266.

⁴⁸ Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 124-125, and Mr. Andrew Scheich deposition transcript, April 8, 2021, at pages 107-108.

⁴⁹ Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 128-129.

⁵⁰ Mr. Bill Goodrich deposition transcript, May 4, 2021, at pages 178-179.

⁵¹ Deposition of Dr. Peter Radecki, August 27, 2021 at pages 56-62.

⁵² Deposition of Dr. Peter Radecki, August 27, 2021 at page 315.

⁵³ Deposition of Mr. David Hartfelder, September 2, 2021 at pages 14-16 and 38-41.

⁵⁴ Deposition of Mr. Robert Gonzales, April 4, 2021, page 252-254.

concluded that the 8L transmissions presented an unreasonable risk to motor vehicle safety for shift harshness nor for shudder. There were no injuries or fatalities, and the transmission performance did not exceed GM's acceptance criteria for vehicle level hazard assessments. All of the investigations were closed without field action to remedy a defect that presented an unreasonable risk to motor vehicle safety.⁵⁵

Transmission inspections

35. Five transmissions that had been removed from vehicles with transmission complaints were inspected on September 27 and 28, 2021. The transmissions were disassembled by Dr. W. M. McVea of KBE and photo-documented by Mr. M. Carpenter of Exponent. Dr. McVea generally followed the transmission disassembly procedure specified in the Automatic Transmission Service Group⁵⁶ manual for GM's Hydra-matic 8L90 transmission.
36. The observations registered in these inspections are reported in Appendix 4 hereto.
37. The transmissions had been previously removed from these host vehicles:
 - a. 2019 Chevy Silverado, 1GCUYDED0KZ179927 (Transmission 1)

⁵⁵ Deposition of Mr. David Hartfelder, September 2, 2021 at pages 71-197.

⁵⁶ A third-party publisher of automotive service literature. .

- b. 2019 Chevy Silverado, 1GCUYEED2KZ214621
(Transmission 2)
 - c. 2019 Chevy Camaro, 1G1FB1RS2K0104144 (Transmission 3)
 - d. 2019 Chevy Colorado, 1GCGSCEN9K1117720
(Transmission 4)
 - e. 2019 Chevy Camaro, 1GTU9BEDXKZ313182
(Transmission 5)
38. The transmissions selected by Plaintiffs for inspection do not represent a common condition. Table 1 is a brief summary of the inspection results for each of the five transmissions. One can note:
- a. Three transmissions did not include input shaft O-rings. The balance did.
 - b. Two transmissions exhibited signs of TCC chatter. The balance did not.
 - c. Two transmissions exhibited input shaft radial play. The balance did not.
 - d. Two transmissions exhibited symptoms of poor TCC bearing rotation. The balance did not.
 - e. One transmission exhibited clutch thermal damage. The balance did not.
 - f. One transmission exhibited 1-3-5-6-7 Clutch Assembly shaft radial play. The balance did not.
 - g. One transmission exhibited scoring to the ID surface of its direct overdrive sun gear. The balance did not.
 - h. One transmission contained quantities of green assembly grease on and in multiple components. The balance did not.
 - i. One transmission exhibited evidence of fluid pan leakage and dry fluid paths. The balance did not.

- j. One transmission exhibited witness marks on the valve body seal surface. The balance did not.
- k. One transmission contained dark transmission oil. The balance did not.
- l. One transmission showed evidence of poor fit between its manual shift valve and body. The balance did not.

Transmission Number:	Key Observations:
Transmission 1	<ul style="list-style-type: none"> • Did not include input shaft O-ring • Clutches in good shape with only localized hot spots • Signs of TCC chatter, porosity, and bluing
Transmission 2	<ul style="list-style-type: none"> • Did not include input shaft O-ring • Input shaft had radial play • Witness marks on valve body seal surface • Clutches in good shape with some darkening of friction material • Signs of TCC chatter and bluing

Transmission 3	<ul style="list-style-type: none"> • Included input shaft O-ring • Dark transmission fluid • Green assembly grease on multiple components • Clutch burning, hot spotting, and material transfer evident • Scoring on inner diameter surface of direct overdrive sun gear • Particulate solids discovered inside filter when ground open
Transmission 4	<ul style="list-style-type: none"> • Had been previously disassembled • Fluid filter missing • Fluid pump sprocket and black O-ring discovered loose in fluid pan • Manual shift valve would not slide in housing, apparently too large OD
Transmission 5	<ul style="list-style-type: none"> • Did not include input shaft O-ring • Evidence of pan leakage • Some fluid passages dry • Electrical connector to IMS sensor loose • Input shaft had radial play • 1-3-5-6-7 Clutch Assembly shaft had radial play • Clutches in good shape with only localized hot spots • TCC one-way clutch had high friction

Table 1. Summary of Key Observations for Each Transmission

39. Inspections of these five transmissions by Plaintiffs' expert Dr. McVea are illustrative of the challenges Plaintiffs face in collecting evidence to present to the Court that is common to the putative class. Dr. McVea disassembled and inspected five transmissions, all of the transmissions differ in evidence of use, wear, component condition, and repair status. The conditions were not common to the five samples. The results of transmission inspections regarding indications of use conditions, wear, component conditions, and transmission repair status are not common across the putative class. None of the transmissions presented common characteristics in these functional elements.

Motor Vehicle Safety and the Use of Consumer Complaints

Motor Vehicle Safety

40. The National Traffic and Motor Vehicle Safety Act was adopted in 1966. The law established the National Highway Traffic Safety Bureau, now known as the National Highway Traffic Safety Administration (NHTSA), to address the need for roadway safety.^{57, 58} This law, its amendments, and associated regulations are key considerations in the development and manufacture of motor vehicles sold in the United States. In part, the Act reads:

“To provide for a coordinated national safety program and establishment of safety standard for motor vehicles in

⁵⁷ Laws of the 89th Congress 2nd Session. National Traffic and Motor Vehicle Safety Act of 1966. 1966. Public Law 89-563; 80 Stat. 718.

⁵⁸ NHTSA's responsibilities were first established by “The Safety Act of 1966” and described in 49 U.S.C. § 301, Motor Vehicle Safety.

interstate commerce to reduce accidents involving motor vehicles and to reduce the deaths and injuries occurring in such accidents.”

“Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Congress hereby declares that the purpose of this Act is to reduce traffic accidents and deaths and injuries to persons resulting from traffic accidents. Therefore, Congress determines that it is necessary to establish motor vehicle safety standards for motor vehicles and equipment in interstate commerce; to undertake and support necessary safety research and development and to expand the national driver register.”

“Sec. 101. This Act may be cited as the National Traffic and Motor Vehicle Safety Act of 1966.”⁵⁹

41. It is impossible to provide an absolute level of safety with no collisions and no injury; this fact was recognized in the promulgation of the Act and *NHTSA was expressly authorized to promulgate rules that ensure a reasonable level of safety performance* in the design of motor vehicle products.

a. “Safety Act of 1966 Purpose and policy - The purpose of this chapter is to reduce traffic accidents and deaths and injuries resulting from traffic accidents.”⁶⁰

⁵⁹ Laws of the 89th Congress 2nd Session. National Traffic and Motor Vehicle Safety Act of 1966. 1966. Public Law 89-563; 80 Stat. 718.

⁶⁰ 49 U.S.C. § 301, Motor Vehicle Safety, § 30101. Purpose and policy.

“Therefore it is necessary--

“(1) to prescribe motor vehicle safety standards for motor vehicles and motor vehicle equipment in interstate commerce; and

“(2) to carry out needed safety research and development.”⁶¹

b. “Definitions -(a) General definitions -- In this chapter—”⁶²

- i. ““defect” includes any defect in performance, construction, a component, or material of a motor vehicle or motor vehicle equipment.”⁶³
- ii. ““manufacturer” means a person -- (A) manufacturing or assembling motor vehicles or motor vehicle equipment;...”⁶⁴
- iii. ““motor vehicle” means a vehicle driven or drawn by mechanical power and manufactured primarily for use on public streets, roads, and highways, but does not include a vehicle operated only on a rail line.”⁶⁵
- iv. ““motor vehicle safety” means the performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident, and includes nonoperational safety of a motor vehicle.”⁶⁶

⁶¹ Ibid.

⁶² 49 U.S.C. § 301, Motor Vehicle Safety, § 30102. Definitions.

⁶³ Ibid.

⁶⁴ Ibid.

⁶⁵ Ibid.

⁶⁶ Ibid.

v. ““motor vehicle safety standard” means a minimum standard for motor vehicle or motor vehicle equipment performance.”⁶⁷

42. A safety defect is defined as a problem that exists in a motor vehicle or item of motor vehicle equipment that *presents an unreasonable risk to motor vehicle safety* and exists in a group of vehicles of the same design or manufacture.⁶⁸

43. 49 U.S.C. § 30115 describes requirements for manufacturers’ responsibilities to market vehicles that comply with applicable safety standards: “Certification of compliance - (a) In general--A manufacturer or distributor of a motor vehicle or motor vehicle equipment shall certify to the distributor or dealer at delivery that the vehicle or equipment complies with applicable motor vehicle safety standards prescribed under this chapter. A person may not issue the certificate if, in exercising reasonable care, the person has reason to know the certificate is false or misleading in a material respect. Certification of a vehicle must be shown by a label or tag permanently fixed to the vehicle. Certification of equipment may be shown by a label or tag on the equipment or on the outside of the container in which the equipment is delivered”.⁶⁹

44. 49 U.S.C. § 30116 establishes the responsibilities and requirements for manufacturers to evaluate, determine, and report any conditions of non-compliance to FMVSS or safety defects

⁶⁷ Ibid

⁶⁸ “Motor Vehicle Safety Defects And Recalls”, NHTSA, page 3.

⁶⁹ 49 U.S.C. § 301, Motor Vehicle Safety, § 30115. Certification of compliance

that exist in vehicles produced by the manufacturer. The Act reads in part: “Defects and noncompliance found before sale to purchaser”

- a. “(a) Actions required of manufacturers and distributors -- If, after a manufacturer or distributor sells a motor vehicle or motor vehicle equipment to a distributor or dealer and before the distributor or dealer sells the vehicle or equipment, it is decided that the vehicle or equipment contains a defect related to motor vehicle safety or does not comply with applicable motor vehicle safety standards prescribed under this chapter—”

“(1) the manufacturer or distributor immediately shall repurchase the vehicle or equipment at the price paid by the distributor or dealer, plus transportation charges and reasonable reimbursement of at least one percent a month of the price paid prorated from the date of notice of noncompliance or defect to the date of repurchase;

“or

“(2) if a vehicle, the manufacturer or distributor immediately shall give to the distributor or dealer at the manufacturer's or distributor's own expense, the part or equipment needed to make the vehicle comply with the standards or correct the defect.”⁷⁰

- b. Thus, vehicle manufacturers must recall and remedy vehicles with known defects.

45. 49 U.S.C. § 30118 establishes the responsibilities and requirements for manufacturers to notify the Secretary of

⁷⁰ 49 U.S.C. § 301, Motor Vehicle Safety, § 30116. Defects and noncompliance found before sale to purchaser.

Transportation of any determination made by the manufacturer that a vehicle was manufactured with a defect that that presents an unreasonable risk to motor vehicle safety; the notice is commonly delivered to NHTSA as a letter or report required by Part 573.⁷¹ This section “Notification of defects and noncompliance” reads in part:

- a. “(c) Notification by manufacturer -- A manufacturer of a motor vehicle or replacement equipment shall notify the Secretary by certified mail, and the owners, purchasers, and dealers of the vehicle or equipment as provided in section 30119(d) of this section, if the manufacturer--
 - (1) learns the vehicle or equipment contains a defect and decides in good faith that the defect is related to motor vehicle safety; or
 - (2) decides in good faith that the vehicle or equipment does not comply with an applicable motor vehicle safety standard prescribed under this chapter.”⁷²
- b. Thus, when a vehicle manufacturer learns or determines a defect that presents an unreasonable risk to motor vehicle safety exists in a population of its vehicles, that manufacturer must remedy the defect.

46. Acting on behalf of the Secretary of Transportation, the National Highway Traffic Safety Administration ("NHTSA") is the U.S. regulatory agency charged with motor vehicle safety.⁷³ It collects and evaluates the consumer complaints it receives, and, at times, complaints received by manufacturers (regardless of cause);

⁷¹ 49 U.S.C. § 301, Motor Vehicle Safety, § 30118. Notification of defects and noncompliance.

⁷² Ibid.

⁷³ 49 U.S.C. § 301, Motor Vehicle Safety, § 30104. Authorization of appropriations.

evaluates available information; and, where appropriate conducts defect investigations.^{74, 75} Defect investigations may result in investigation closure with no defect finding, a finding of safety defect (with consequent recall), manufacturers' corrective service actions for vehicles in the field that require a repair but not a correction to a safety-related defect, and/or information that can be used by the manufacturer in improving future vehicle designs.

47. In the event a vehicle manufacturer learns or determines that a defect presenting an unreasonable risk to motor vehicle safety exists, the vehicle manufacturer must notify NHTSA. 49 U.S.C. § 30119 requires manufacturers to inform NHTSA with specific information in the Part 573 communications.⁷⁶ Some elements of the notice provisions are:

- a. “Notification procedures” (a) Contents of notification -- Notification by a manufacturer required under section 30118 of this title of a defect or noncompliance shall contain--
 - i. “a clear description of the defect or noncompliance;
 - ii. “an evaluation of the risk to motor vehicle safety reasonably related to the defect or noncompliance;
 - iii. “the measures to be taken to obtain a remedy of the defect or noncompliance;
 - iv. “a statement that the manufacturer giving notice will remedy the defect or noncompliance without charge under section 30120 of this title;
 - v. “the earliest date on which the defect or noncompliance will be remedied without charge, and for tires, the

⁷⁴ 49 U.S.C. § 301, Motor Vehicle Safety, § 30118. Notification of defects and noncompliance.

⁷⁵ “Motor Vehicle Safety Defects And Recalls”, page 1.

⁷⁶ 49 U.S.C. § 301, Motor Vehicle Safety, § 30119. Notification procedures.

period during which the defect or noncompliance will be remedied without charge under section 30120 of this title;

- vi. “the procedure the recipient of a notice is to follow to inform the Secretary of Transportation when a manufacturer, distributor, or dealer does not remedy the defect or noncompliance without charge under section 30120 of this title; and
- vii. “other information the Secretary prescribes by regulation.”⁷⁷

48. 49 U.S.C. § 301, Motor Vehicle Safety, § 30120 specifies the nature of defect remedies manufacturers may apply to correct a defect related to motor vehicle safety in “Remedies for defects and noncompliance”.⁷⁸ This section specifies:

- a. “(a) Ways to remedy.--(1) Subject to subsections (f) and (g) of this section, when notification of a defect or noncompliance is required under section 30118(b) or (c) of this title, the manufacturer of the defective or noncomplying motor vehicle or replacement equipment shall remedy the defect or noncompliance without charge when the vehicle or equipment is presented for remedy. Subject to subsections (b) and (c) of this section, the manufacturer shall remedy the defect or noncompliance in any of the following ways the manufacturer chooses:
- b. “(A) if a vehicle--
 - “(i) by repairing the vehicle;

⁷⁷ Ibid.

⁷⁸ 49 U.S.C. § 301, Motor Vehicle Safety, § 30120, Remedies for defects and noncompliance.

“(ii) by replacing the vehicle with an identical or reasonably equivalent vehicle; or

“(iii) by refunding the purchase price, less a reasonable allowance for depreciation.”

- c. “(i) Limitation on sale or lease of new vehicles or equipment.--(1) If notification is required by an order under section 30118(b) of this title or is required under section 30118(c) of this title and the manufacturer has provided to a dealer (including retailers of motor vehicle equipment) notification about a new motor vehicle or new item of replacement equipment in the dealer's possession at the time of notification that contains a defect related to motor vehicle safety or does not comply with an applicable motor vehicle safety standard prescribed under this chapter, the dealer may sell or lease the motor vehicle or item of replacement equipment only if -- (A) the defect or noncompliance is remedied as required by this section before delivery under the sale or lease;...”⁷⁹

Use of Consumer Complaints in Defect Investigations

49. NHTSA and vehicle manufacturers solicit and receive consumer complaints related to perceived vehicle problems, failures, and malfunctions.
- a. Consumers' reports of perceived vehicle malfunctions can serve as indicators of consumer use patterns, reactions to, objections to, preferences for, likes, and dislikes of particular vehicle operating or design characteristics; such reports are not necessarily indicative of a defect in performance. As

⁷⁹ 49 U.S.C. § 301, Motor Vehicle Safety, § 30120. Remedies for defects and noncompliance.

examples, consider that an increase in engine noise may be perceived and reported as a complaint; internal combustion engines are vibration generators, vehicle components all have natural frequencies that may be dynamically excited and are engineered to mitigate the physical responses; for example, control of powertrain bending and the first body harmonic. All of these normally occurring vibrational conditions, although engineered to optimize performance, may dissatisfy or irritate some users or cause the disapproval of some consumers even though the effects on vehicle utility, durability, reliability, and safety may be benign.

- b. Motor vehicle safety, however, is measured as risk of collision or injury causally related to the occurrence of a problem, failure, or malfunction during use of the product. Safety-related defects are assessed on the basis of the level of risk presented to motor vehicle users consequent to presentation of the problem, failure, or malfunction. If the risk level is unreasonable, a safety defect exists and is subject to recall remedy.
- c. Defect investigations initiated in response to consumer complaints may result in: Investigation closure with no defect finding, a finding of safety defect (with consequent recall), manufacturers' corrective service actions for vehicles in the field that require a repair but not a correction to a safety-related defect, extended warranty, policy adjustments, and/or information that can be used by the manufacturer in improving future vehicle designs.

50. NHTSA receives consumer complaints through a “hotline” and its “vehicle safety website” www.nhtsa.gov.⁸⁰ Consumers making reports are asked to provide information that agency staff use to evaluate reported problems. The information provided by consumers is registered in a Vehicle Owner’s Questionnaire (VOQ), entered into the agency’s consumer-complaint database, and forwarded to NHTSA technical staff for evaluation.⁸¹ The VOQ records vehicle make, model, model year, manufacturer, the affected part, assembly, or system, and whether a collision occurred.⁸²

51. Importantly, registration of consumers’ complaints is not an indicant of a defect that creates an unreasonable risk to motor vehicle safety. That is why motor vehicle manufacturers and NHTSA use consumer complaints as only one input in consideration of technical investigations into vehicle performance characteristics that may pose a risk to motor vehicle safety.

52. Consumer complaints cannot serve as the sole basis upon which a determination of a safety defect would hinge. Consumer complaints merely establish that some consumers were complaining of some condition; by themselves such complaints do not show that a vehicle manufacturer had knowledge of a vehicle defect or that a defect exists.

a. Although consumer complaints can sometimes alert vehicle manufacturers of the need to begin an investigation into a potential defect, the complaint records themselves are not

⁸⁰ “Motor Vehicle Safety Defects And Recalls”, NHTSA, pages 4 and 5.

⁸¹ Ibid, page 4.

⁸² Ibid, page 5.

particularly useful in identification of the specific engineering cause of the symptoms or conditions that motivated the complaint because they report consumers' subjective perceptions of performance or conditions and generally do not provide objective, measurable, quantified technical data upon which engineering assessments can be based.

- b. From an engineering perspective, consumer reports often are:
 - i. fragmentary and lacking a complete set of factual circumstances surrounding the objectionable event or condition;
 - ii. unclear as to the specific event or condition as regards the contributing vehicle systems or components; and
 - iii. limited in technical content with an absence of objective performance metrics (for example: engine speed, vehicle speed, road load, response time to control stimulus or input, and gear range) that could be measured against standards.

53. To understand and, where appropriate, remedy vehicle-based concerns, it is necessary to undertake a fulsome engineering analysis to identify the root cause of the specific symptom/vehicle couple (a "root cause analysis").

54. Root cause determination is complicated when a wide range of symptoms and vehicles are aggregated into a generalized allegation with no underlying technical bases for association. This is the situation we find in the instant case as it appears Plaintiffs

have conflated transmission shudder with shift quality, a different complaint condition.^{83, 84, 85}

55. Although consumer complaints can sometimes alert vehicle manufacturers of the need to begin an investigation into a potential defect, complaint records themselves are almost never complete in identification of the specific engineering cause of the symptoms or conditions that motivated the complaint. In some cases, registration of a diagnostic explanation (if available) from a service facility as to the cause of the complaint can add meaning to a customer complaint record. This is not surprising. Motor vehicles are highly engineered and very complex consumer products with advanced technology and multiple interrelated systems and components. Figure 1 illustrates the vehicle systems that interact to yield drive quality performance of the integrated vehicle.

⁸³ “Complaint” ¶¶ 4 and 5.

⁸⁴ “Expert Report of Allise Wachs, October 8, 2021, Wesley Won, et. al. v. General Motors, LLC (E.D. Mich.)” at ¶ 66, she wrote “I understand from counsel that both shudder and harsh shift are symptoms of the same faulty friction system.”

⁸⁵ “Report of William Mark McVea” Section, “B. TCC Shudder, 1 Root Cause” at ¶ 51 and Section “C. Poor Drive Quality - Harsh Shifts, 1 Root Cause” at ¶ 64.

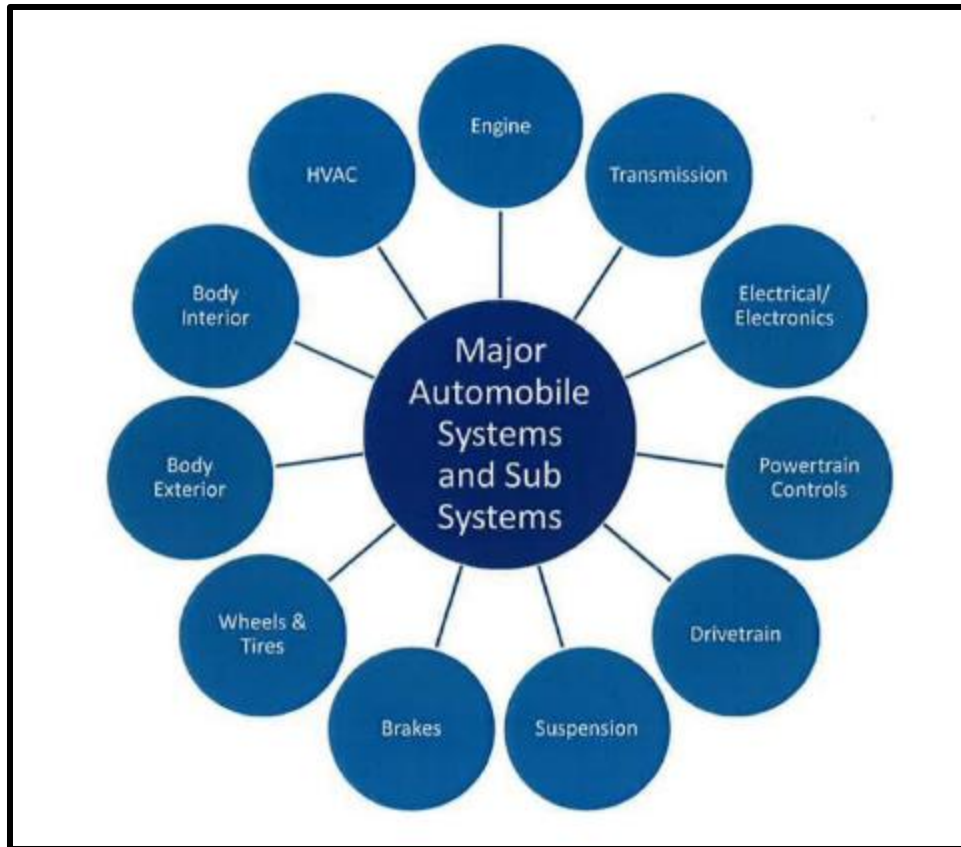


Figure 1. Major vehicle systems influencing drive quality.

56. Most consumers do not have the specialized knowledge and expertise necessary to develop a fundamental understanding of the engineering problem and how the systems, components, environmental factors, and operational interactions may relate to a problem manifest as a perceived deficiency in vehicle performance. Indeed, in many defect investigations, significant technical resources (human, facilities, and equipment) must be applied to fully investigate, define scope, assess risk, determine cause, and resolve a problem before a manufacturer can fully settle upon a course of action involving field service repairs, recall, or no action.

57. Disciplined engineering investigations of consumer complaints can enable development of technical understandings regarding the cause, and potential need for, an engineered remedy for the complaint condition. Remedy solutions range from service or policy actions to recalls. Manufacturers' commencement of technical investigations into the nature and cause of consumer complaints do not necessarily result in service actions, defect determinations, or recall remedy.

58. Regardless of the level of detail in a consumer report, automobile manufacturers and NHTSA follow similar processes to investigate and resolve potential concerns brought to their attention by customers, consisting of:

- a. Recognition of a potential operational failure or performance anomaly reported by owners or operators; some reports may involve collision and/or injury, or could potentially result in collision and/or injury.
- b. Collection of information and data related to the factual circumstances associated with the events that had been reported by owners/operators.
- c. Collection of information and data related to the technical status, operating conditions, and functions of vehicles involved in the reported events, failures, malfunctions, or performance anomalies.
- d. Data analysis and critical assessment.
- e. Identification and analyses of potential causes for the reported events, failures, malfunctions, and performance anomalies, as well as formulation of hypotheses as to cause.
- f. Testing and evaluation of alternative hypotheses for verification or rejection to establish the cause of reported

failures or performance anomalies, and to contribute to an understanding of whether or not a vehicle defect is the cause of the reported failures, malfunctions, or performance anomalies.

- g. Assessment of the safety risk (including severity of collision or injury) and determination of whether a vehicle-based safety defect exists.
 - h. Resolution as to the need for field action.
 - i. Process review to determine systemic engineering failures that led to a defect finding, or other actions as applicable, and what engineering process changes may be necessary to preclude reoccurrence of the process failure. Sometimes called “Lessons Learned”.
59. GM’s potential defect investigation process is outlined in Mr. David Hartfelder’s deposition Exhibit 578 at slide 24. An image of that slide appears below as Figure 2.

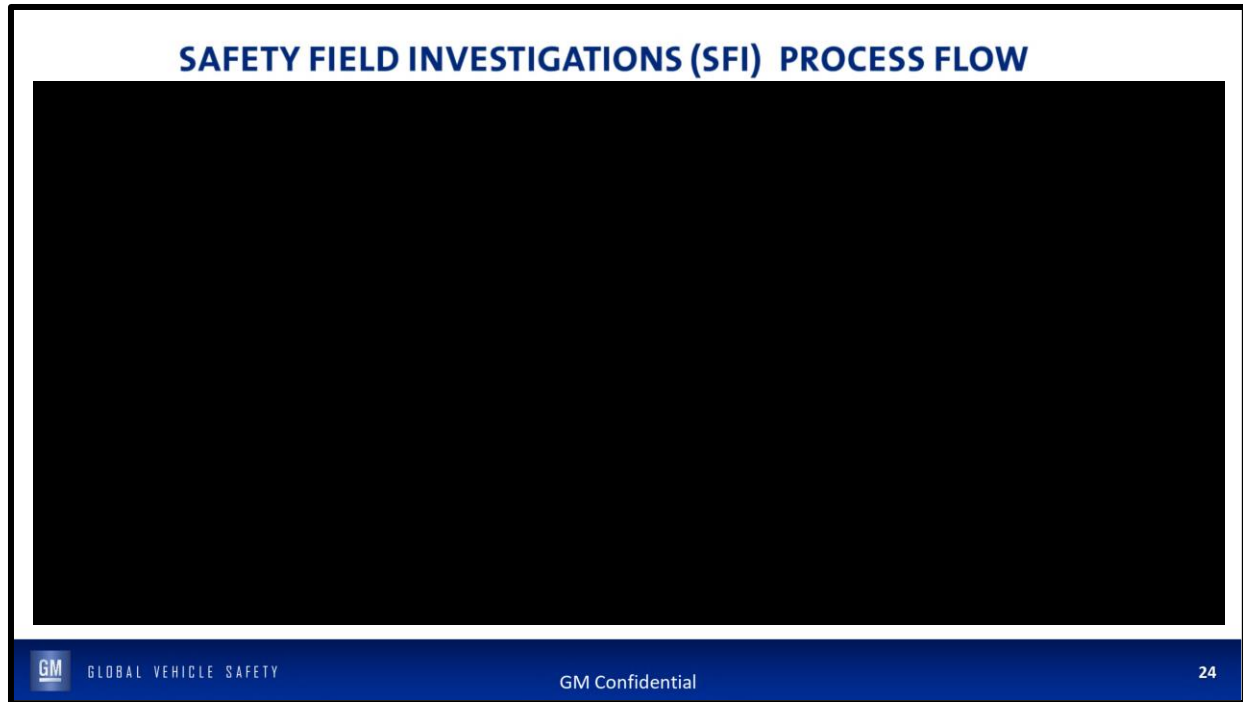


Figure 2. GM Safety Field Investigations (SF1) Process Flow diagram.⁸⁶

- a. The process initiates at the left side of the diagram and sequentially progresses through steps to the right. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
- b. [REDACTED]
[REDACTED]
- c. [REDACTED]
- d. Steps necessary to execution of the decision follow, including Part 573 notice to NHTSA and lessons learned as appropriate.

⁸⁶ Mr. David Hartfelder's deposition transcript, September 2, 2021, Exhibit 578, Slide 24.

60. Following investigations of consumer concerns, manufacturers utilize the results of their investigation and analytical processes to identify opportunities for performance improvement in some specific vehicle designs with unique complaint histories and effect corrective actions through field service operations. The process of improvement through field service action usually is applied by publication of a "Technical Service Bulletin" ("TSB"). If a safety-related defect is identified, the appropriate remedy is a safety recall.
- a. In developing countermeasures, manufacturers consider interactions between systems and the potential that the countermeasure may adversely affect or disable some other safety feature or critical function. Manufacturers must ensure against such adverse effects and thus engineer solutions that simultaneously resolve the concern in question and do not adversely affect other systems or vehicle level functions.
 - b. Application of a countermeasure that does not address the underlying concern is a waste of both the manufacturer's and consumers' resources. It is in both the manufacturer's and consumers' interest for the manufacturer to engineer an appropriate countermeasure, that can only be determined and validated after a root cause analysis.
61. As is true generally, the existence of consumer complaints specific to drive quality and vehicle speed control concerns, by themselves, are not indicative of the presence of a safety-related defect, nor is the investigation of such complaints necessarily indicative of such a defect:
- a. A consumer's report of a drive quality related complaint is often associated with that particular consumer's subjective

reaction to specific dynamic vehicle performance characteristics associated with powertrain system interactions.

- b. Resolution of such investigations by application of service actions to correct perceived performance deficiencies is not indicative of the presence of a safety-related defect in a subject population, much less in a collection of vehicles with diverse systems architectures and specific design configurations.
- c. Resolution of issues may result in manufacturers' conclusions to take no field action.

62. In the instant case, Plaintiffs have cited 136 NHTSA VOQs in their Complaint.⁸⁷ Plaintiffs characterized their collection as a sampling “...of safety-related complaints describing the Transmission Defect.”⁸⁸ For this analysis, Exponent reviewed the narratives of the 136 NHTSA VOQs that had been selected by Plaintiffs specifically to show common evidence of transmission shift harshness and shudder (the defect as they allege), and to show those conditions present an unreasonable risk to motor vehicle safety.

- a. The NHTSA VOQs cited in the “Complaint” include the following vehicle model/model year combinations:
 - i. 2015, 2016 Cadillac Escalade
 - ii. 2015 Chevrolet Corvette
 - iii. 2015, 2016, 2017 Chevrolet Silverado
 - iv. 2015, 2016, 2017 GMC Sierra

⁸⁷ “Complaint” at ¶¶ 165 – 304.

⁸⁸ “Complaint” at ¶ 167.

- v. 2015, 2016, 2017 GMC Yukon Denali
 - vi. 2016, 2017 Chevrolet Camaro
 - vii. 2017, 2018 GMC Canyon
 - viii. 2018 Chevrolet Colorado
- b. Exponent searched the narratives for keywords related to shudder and harsh shift and discovered:
- i. 92 of the 136 VOQs included “transmission” in the narrative. The 44 NHTSA VOQs that do not identify “transmission” in the complaint, could in no way serve as notice to GM of transmission defect(s). On its face, Plaintiffs’ proffer of this collection of VOQs cannot serve as proof of transmission defects common to the putative class, some of the VOQs are not related to the subject transmissions.
 - ii. 85 of the 136 VOQs included a keyword related to shudder. The keywords included in the search are: shud*, vibra*, shutter, rumbl*, noise, shak*, rough, clunk*, chatter, banging, rattl*, stutter, vib*, flutter, sudder, sputter, judder, convertershudd*, tccshudd*, shuder, overrumbl*, viberat*, thump*, hudder, studd*, bump*, rump*, shuud*, bounce*.
 - 1. On their face, it is clear not all of these nouns or adjectives have the same meaning. A “bump” or “thump” is not the same experience as a “rattle” or a “vibra*” or a “chatter”.
 - 2. These 85 NHTSA VOQs individually and collectively, cannot serve as notice to GM of transmission defect(s). There is no uniformity of symptom.

- a. These 85 NHTSA VOQs that might be proffered by Plaintiffs as proofs of defects common to the putative class are not common among themselves. The descriptions of the complaints are not consistent.
 - b. It is not possible to reasonably posit that each of these different descriptors were manifest due to a common technical cause universally present across the putative class.
- iii. 99 of the 136 VOQs include a keyword related to shift harshness. The keywords included in the search are: shak*, rough, clunk*, banging, thump*, bounce*, shift, hard, harsh, slip*, jerk, downshift, engag*, bang, clunk, stuck, clutch*, stick, jump, slam, lung*, lurch, kick, grind, skip, slug, jolt, thump, snap.
1. On their face, it is clear not all of these nouns or adjectives have the same meaning. A “shake” is not the same experience as a “jump” or a “banging”.
 2. These 99 NHTSA VOQs cannot serve as notice to GM of transmission defect(s).
 3. These 99 NHTSA VOQs that might be proffered by Plaintiffs as proofs of defects common to the putative class, are not themselves common. The descriptions of the complaints are not consistent.
 4. It is not possible to reasonably posit that each of these different descriptors were manifest due to a common technical cause universally present across the putative class.

- c. Plaintiffs wrote: “3. Numerous Consumer Complaints on the NHTSA [*sic*] Demonstrate That GM Was Aware of the Transmission Defect.”⁸⁹ The first NHTSA VOQs narrative Plaintiffs offer in support reads “ACCELERATION FOR NO REASON. I WAS BACKING OUT OF A PARKING SPOT AND I PUT THE CAR IN REVERSE. I WAS NEARING THE EDGE OF THE CURB ON MY RIGHT FRONT WHEEL SO I STEPPED ON THE BRAKE, STOPPED THE CAR, AND SHIFTED INTO DRIVE SO I COULD MOVE THE VEHICLE FORWARD TO AVOID HITTING THE CURB WHILE BACKING OUT. ONCE I SHIFTED INTO DRIVE, THE CAR WENT TO FULL ACCELERATION FOR NO REASON AND HIT A POLE AT FULL ACCELERATION APPROXIMATELY 5 FEET AWAY.”⁹⁰
- i. Neither transmission “shudder” nor a harsh shift manifest as full throttle acceleration when not commanded by the driver.
 - ii. However, this description is a classic presentation of pedal misapplication as cause of unintended acceleration. It is unknown how many other drive quality reports may be due to pedal misapplication or other cause unrelated to the alleged transmission defects.
- d. Plaintiffs also offered this NHTSA VOQ: “MY 2015 CADILLAC ESCALADE HAS BEEN IN THE SHOP FOR 130+ DAYS IN THE FIRST CALENDAR YEAR FOR DEFECTIVE BRAKES, TRANSMISSION, SUSPENSION,

⁸⁹ “Complaint” page 45.

⁹⁰ “Complaint” at ¶ 168.

ELECTRICAL, AND HVAC. I HAVE CONTACTED GM AND THEY DON'T WANT TO REPURCHASE THE VEHICLE. THE VEHICLE IS CONSTANTLY IN THE SHOP FOR PROBLEMS AND IT IS NOT A VEHICLE THAT SHOULD BE OPERATED ON PUBLIC ROADWAYS. THE TRANSMISSION HAS BEEN REPLACED ONCE BEFORE DUE TO DEFECTS IN DESIGN AND BUILD QUALITY. THE TRANSMISSION NOW CAUSES THE CAR TO TAKE OFF IN 4TH GEAR RATHER THAN IN 1ST GEAR WHICH MEANS THE CAR FEELS AS IF THERE IS NO POWER TO PROPEL THE VEHICLE. THE TRANSMISSION SLIPS AND FEELS AS IF IT IS BROKEN. I HAVE TAKEN IT TO THE DEALER AT LEAST 5 TIMES AND GM NOW DOES NOT WANT TO REPLACE THE TRANSMISSION EVEN THOUGH THE DEALER HAS VERIFIED THE CONCERN AND DOCUMENTED IT. I FEEL THAT GM IS NOT DOING ENOUGH TO ENSURE SAFE VEHICLES ARE ON THE ROAD. THIS TRANSMISSION ISSUE IS GOING TO CAUSE AN ACCIDENT ONE DAY. I HAVE ALREADY PUT GM ON NOTICE ALL THE WAY UP TO THE EXECUTIVE LEVEL AND THEY DON'T WANT TO DO ANYTHING ABOUT IT. I FEEL THAT NHTSA SHOULD INVESTIGATE THE ISSUES THAT PLAGUE 2015 FULL SIZE GM SUV OWNERS. THERE ARE A LOT OF US OUT THERE ACCORDING TO MY RESEARCH.”⁹¹

⁹¹ “Complaint” at ¶ 169.

- i. This is a complaint related to transmission malfunction or failure. However, the explicit transmission related complaints are “starts in 4th gear” and “slips”; these malfunctions are not the defects of shudder and poor shift quality⁹² articulated in the “Complaint”.
 - ii. This NHTSA VOQ is not supportive of any shudder or shift quality defect claim Plaintiffs may proffer as evidence common across the putative class.
- e. Plaintiffs also offered this NHTSA VOQ: “ENGINE NOISE AND VIBRATION ON COLD START. VERY LOUD GRINDING NOISE COMING FROM ENGINE. HAD IT LOOKED AT 2 TIMES. DEALER SERVICE MANGER JIMMIE STATES ITS NORMAL. THEY ALL MAKE THAT NOISE. I AM 54 YEARS OLD OWNED MORE THAN 15 CARS IN MY LIFE . THIS IS NOT NORMAL. THEY DO NOT WANT TO FIX IT.”⁹³
 - i. This is a complaint of cold start engine noise and vibration unrelated to the transmission.
 - ii. This NHTSA VOQ is not supportive of any shudder or shift quality defect claim Plaintiffs’ may proffer as evidence common across the putative class.
- f. Plaintiffs also offered this NHTSA VOQ: “CAR VIBRATES FROM 35MPH UP TO 80 PLUS. HAD IT TO DEALER 5 TIMES AND THEY KNOW THAT THERE IS A VIBRATION. THEY SAID GM SAID THE TORQUE CONVERTER WAS OUT OF BALANCE AND GM WAS DESIGNING A FIX. ABOUT 5 CALLS AND THREE

⁹² “Complaint” at ¶¶ 4 - 6.

⁹³ “Complaint” at ¶ 170.

WEEK LATER THEY RECEIVED A NEW SPECIAL TORQUE CONVERTER AND AFTER IT WAS INSTALLED THE VIBRATION WAS STILL THERE. YOU CAN FEEL THE VIBRATION IN THE STEERING WHEEL, THROTTLE, CENTER CONSOLE, FLOOR, AND THE SEAT. THE SERVICE MANAGER HAS BEEN VERY POLITE AND HAS GONE OUT OF HIS WAY TO HELP. A GM FIELD SERVICE REP HAS LOOKED AT THE CAR AND SAID IT IS WITHIN GM SPEC,S [sic]. I AM READING ALL OVER THE INTERNET OF THE SAME PROBLEM AND GM HAS REPLACED DRIVELINES, TRANSMISSIONS, TIRES, TORQUE CONVERTERS, SHOCKS, REAR AXLES, ENGINE MOUNTS, ETC. AND STILL HAVE A VIBRATION PROBLEM. THEY HAVE EVEN BOUGHT SOME OF THE 2015 AND 2016 BACK. THIS IS HAPPENING ON ALL GM FULL SIZE SUV'S. CHEVROLET, GMC, AND CADILLAC.”⁹⁴

- i. This complaint is a vibration over the entire speed range of 35 mph to 80 mph. The description is not consistent either with shudder or shift quality. Evidently, nearly the entire vehicle cabin vibrated in presentation of the problem.
- ii. According to the writer, the potential causes for similar complaints are: “drivelines”, “transmission”, “tires”, “torque converters” (a component of the transmission), “shocks”, “rear axles”, “engine mounts” and unspecified others.

⁹⁴ “Complaint” at ¶ 171.

- iii. The writer claims the torque converter was replaced and the vibrations to which they objected remained after repair. This indicated the problem was probably not caused by the torque converter.
- iv. This NHTSA VOQ is not supportive of any shudder or shift quality defect claim Plaintiffs' may proffer as evidence common across the putative class.

63. These NHTSA VOQ complaints were selected by Plaintiffs and are repeated here in the same order Plaintiffs published in their "Complaint"; they are simply the first four VOQs Plaintiffs' selected to support their claims. My review of these and the other consumer complaint descriptions Plaintiffs included in the "Complaint"⁹⁵ lead to these conclusions:

- a. Not all of the consumer complaints selected by Plaintiffs are related to transmission issues.
- b. The complaints selected by Plaintiffs do not have a consistent description of a transmission failure or malfunction.
- c. The complaints selected by Plaintiffs do not have adequate descriptive elements to determine the cause of the malfunctions irritating the complaint writer.
- d. The complaints selected by Plaintiffs have no data that is useful to technical analyses; they are typical of the limited value presented by consumer complaints to defect investigations.
- e. Some of the complaints selected by Plaintiffs fail to describe failures or malfunctions with shifting issues in the two 8-speed automatic transmissions at issue in the instant case.

⁹⁵ "Complaint" at ¶¶ 168 - 354

- f. Plaintiffs' collections of complaints fail to show common evidence of transmission shift harshness or shudder.
64. The collection of complaints selected by Plaintiffs and published in the "Complaint" does not provide notice to GM or to NHTSA of transmission defects that present an unreasonable risk to motor vehicle safety.
65. This collection of complaints does not provide Plaintiffs with information that would be helpful to them in locating and presenting evidence of a transmission defect common to the putative class.
66. It is unlikely that an investigation undertaken pursuant to the steps described in ¶¶ 58 – 60 supra would discover a common defect(s) in a population of vehicles as diverse as the putative class', or that such an investigation could provide notice of a common defect(s) that existed in all of the class vehicles throughout the entire class period.
- a. Different vehicle architectural generations manifest different design characteristics in: Vehicle power to weight ratio, occupant seating height, driver knee angle, cabin noise level, and vehicle response characteristics on acceleration and brake application.
 - b. Different powertrain, brake, throttle, and tire systems manifest different design characteristics in: Engine power output, brake capacity, brake pedal gain, accelerator pedal response linearity, tire/roadway adhesion properties, powertrain control strategies and execution, and integrated

vehicle level response characteristics to pedal applications or misapplications.

- c. Different powertrain systems and vehicle architectures will manifest different performance characteristics in various dimensions of:
 - i. transmission shift dynamics on acceleration and deceleration;
 - ii. launch smoothness (start from stop) and acceleration response to pedal application;
 - iii. latency time and dynamic response to brake application;
 - iv. accelerator and brake pedal gain characteristics (the vehicle level response resultant from pedal actuation);
 - v. structural vibrational response to road-generated and vehicle-generated excitations;
 - vi. structural noise response to and transmission of powertrain and body excitations; and
 - vii. other noise, vibration, or harshness responses.

67. Plaintiffs also referenced “...at least 60 service bulletins...” (TSBs) as notice of knowledge of transmission defects.⁹⁶ Issuance of a TSB is not necessarily indicative that a defect exists. Some TSBs are issued to address customer complaints of subjective dislikes (as is the case here) and if a safety defect is identified, a TSB is not a full or appropriate remedy; a recall would be.

68. GM is not the only manufacturer that has issued transmission-related TSBs. NHTSA maintains a database of TSBs

⁹⁶ “Plaintiffs Complaint” at ¶¶ 105 – 164.

issued by manufacturers that sell motor vehicles in the U.S. The Service Bulletin file contains manufacturer issued technical notices; 3,224,167 service bulletins were received by NHTSA since January 1, 1995.⁹⁷

- a. The Service Bulletin file has 10 columns per entry: Service Bulletin Number, Replacement Service Bulletin Number, NHTSA Item Number, Date of Bulletin, Code for Failing Component, Vehicle/Equipment Make, Vehicle/Equipment Model, Model Year (9999 if unknown or N/A), Date Added to File, Description of Summary.⁹⁸
- b. There are 28,883 duplicate entries in this file (identity in all 10 columns). Removing these duplicate entries yields 3,195,284 unique TSBs in the listing.
- c. Of 3,195,284 unique TSBs, 186,686 entries include one or more of the search keywords: “shift”, “transmission”, “shudder”, “harsh”, “hard”, or “engagement” in the “Description of Summary” column.
- d. These 186,686 TSB entries were categorized as “Harsh Shift” related” and/or “Shudder related” and tabulated using these criteria, categorization is not mutually exclusive:
 - i. If the “Description of Summary” column for a given entry includes any of the (“hard”, “harsh”, “difficult”) keywords in combination with any of the (“engagement”, “shift”) keywords it was categorized as a “Harsh Shift” related TSB.

⁹⁷ NHTSA/ODI Databases, <https://www-odi.nhtsa.dot.gov/downloads/flatfiles.cfm>. Downloaded 11/19/2021.

⁹⁸ Ibid.

- ii. If the “Description of Summary” column for a given entry includes the keyword (“shudder”) it was categorized as a “Shudder” related TSB.
- e. The total count for Harsh Shift related TSBs is 9,669 entries. Vehicle manufacturers Audi, BMW, Chrysler, Ford, Honda, Hyundai, Isuzu, Jaguar, Land Rover, Mazda, Mercedes Benz (Daimler), Mitsubishi, Subaru, Toyota, Volkswagen, and Volvo and others have issued TSBs for harsh shift.
- f. The total count for Shudder related TSBs is 12,410 entries. Vehicle manufacturers Audi, BMW, Chrysler, Ford, Honda, Hyundai, Isuzu, Jaguar, Land Rover, Mazda, Mercedes Benz (Daimler), Mitsubishi, Subaru, Toyota, Volkswagen, and Volvo and others have issued TSBs for shudder.
- g. Issuance of a transmission-related TSB for harsh shift or shudder is not a condition unique to GM. It is not necessarily indicative of a transmission defect nor necessarily indicative of a safety related defect that presents an unreasonable risk to motor vehicle safety.

69. Exponent analyzed NHTSA databases⁹⁹ listing recalls¹⁰⁰ and potential safety defect investigations¹⁰¹ to identify records for “shudder” and “harsh” or “hard” shifting automatic transmissions.

70. Analyzing the NHTSA recalls database¹⁰² yielded a single result for “shudder” for passenger vehicles with “automatic transmission” as the component of interest. This recall was

⁹⁹ NHTSA/ODI Databases, <https://www-odi.nhtsa.dot.gov/downloads/flatfiles.cfm>. Downloaded 11/19/2021.

¹⁰⁰ Ibid.

¹⁰¹ Ibid.

¹⁰² Ibid.

number 05V396000, involving the 2005 Jeep Grand Cherokee.¹⁰³ In this recall, water from the air conditioner evaporator could enter the transmission, contaminating the ATF, and cause shudder; the safety concern addressed by this recall was that water in the transmission could boil and force contaminated ATF out of the transmission causing the potential for an underhood fire¹⁰⁴ due to hot surface ignition. The unreasonable risk was the potential for fire, not transmission shudder from water contamination.

71. No results for “harsh shift” or “hard shift” were found in the NHTSA recall database¹⁰⁵ with “automatic transmission” as the component at issue.

72. Review of the NHTSA safety defect investigations database¹⁰⁶ yielded zero entries for “shudder”, “harsh shift”, or “hard shift” in the summary detail. NHTSA has opened no safety defect investigations for automatic transmission harsh shift or shudder.

- a. Exponent analyzed the description of VOQ complaints provided by Plaintiffs for evidence of collisions related to their complaints. In these complaints, one owner describes their vehicle hitting an object as part of their complaint: the 05/13/2015 complaint for a 2015 Cadillac Escalade reported “...SHIFTED INTO DRIVE SO I COULD MOVE THE VEHICLE FORWARD TO AVOID HITTING THE CURB

¹⁰³ Recalls, 2005 Jeep Grand Cherokee, NHTSA, <https://www.nhtsa.gov/vehicle/2005/JEEP/GRAND%252520CHEROKEE/4%252520DR#recalls>.

¹⁰⁴ Ibid.

¹⁰⁵ NHTSA/ODI Databases, <https://www-odi.nhtsa.dot.gov/downloads/flatfiles.cfm>. Downloaded 11/19/2021.

¹⁰⁶ Ibid.

WHILE BACKING OUT. ONCE I SHIFTED INTO DRIVE, THE CAR WENT TO FULL ACCELERATION FOR NO REASON AND HIT A POLE AT FULL ACCELERATION APPROXIMATELY 5 FEET AWAY.”¹⁰⁷

- b. The description of this collision is a classic presentation of pedal misapplication as cause of unintended acceleration while shifting the car into drive. The owner stated that the vehicle “hit a pole at full acceleration”, the issue in the instant case is related to transmission shift quality, not engine surging or other causes that might be related to engine performance or excess power being supplied by the engine.
- c. One additional VOQ provided by Plaintiffs registered a “Y” to the question of “was the vehicle involved in a crash, ‘Y’ or ‘N’”, this was the complaint for a 2016 Cadillac Escalade submitted on 09/13/2018. The narrative from this 09/13/2018 complaint does not mention this vehicle being involved in a crash, only that the owner experienced their vehicle “buck and surge”, and that they felt “this is a safety issue”.¹⁰⁸

73. Eight other descriptions of complaints provided by Plaintiffs describe feeling as if their vehicle was “hit” by another car during a harsh shift event, but they do not report a collision due to a harsh shift. One example of these reports is a complaint dated 10/27/2015 for a 2015 Chevrolet Corvette, in which the owner stated: “8 SPEED AUTOMATIC TRANSMISSION DOWN SHIFTS AT A STOP WITH SUCH FORCE IT FEELS AS YOU

¹⁰⁷ “Complaint” at ¶ 168.

¹⁰⁸ “Complaint” at ¶ 175.

HAVE BEEN HIT FROM BEHIND BY ANOTHER CAR WHILE COMING TO A STOP.”¹⁰⁹ In these eight cases, the owners are describing the sensation of a harsh shift but have not been involved in a collision.

74. Six additional entries of complaints provided by Plaintiffs describe owners feeling that they are at risk of involvement in an accident. For example: The 06/15/2018 complaint for a 2017 GMC Sierra the owner stated “...THEY TELL ME IT IS NOT DANGEROUS, BUT I AM CONCERNED THAT THE NOISE/MOVEMENT, COULD CAUSE MYSELF OR ANOTHER FAMILY MEMBER TO SWERVE OR BRAKE HARD AND CAUSE AN ACCIDENT”.¹¹⁰

- a. In this case the owner was not involved in a collision, but speculated they might have an accident.
- b. Similarly, in the complaint dated 01/28/2015 for a 2015 GMC Sierra, the owner stated “...AN ACCIDENT MIGHT HAVE OCCURRED”¹¹¹ when describing their incident.
- c. Also, the owner of a 2017 GMC Canyon complained on 02/05/2018 that they were concerned about “...BEING STRANDED OR WORSE CAUSING AN ACCIDENT FROM SOMETHING COMING LOOSE.”¹¹² Here the owner is worried that vibrations may cause something from their vehicle “coming loose” and that might cause an accident.

¹⁰⁹ “Complaint” at ¶ 180.

¹¹⁰ “Complaint” at ¶ 279.

¹¹¹ “Complaint” at ¶ 250.

¹¹² “Complaint” at ¶ 298.

75. Two complaints provided by Plaintiffs describe incidents in which the owners reported they might crash or had to brake to avoid a crash. In a 07/20/2017 complaint on a 2017 GMC Sierra, the owner stated “...HAD TO ENGAGE THE BRAKE PEDAL WITH FORCE TO AVOID A CRASH”.¹¹³ In the 08/01/2016 complaint for a 2015 GMC Yukon Denali, the owner stated “...I ALMOST CRASHED INTO THE CAR MERGING IN FRONT OF ME”.¹¹⁴ In both these cases the vehicles were not involved in a collision, but the owners stated they “almost crashed”, or had to brake to “avoid a crash”.

76. To determine if the owner answered the VOQ entry of “was the vehicle involved in a crash, ‘Y’ or ‘N’” Exponent matched the vehicle (make, model, model year), complaint date, and text provided by Plaintiffs¹¹⁵ with the publicly available VOQ database¹¹⁶ provided by NHTSA.

77. The NHTSA VOQ allows owners to specify the particular vehicle component that is at issue for their complaint. The NHTSA VOQ includes the following categories for power train and subcategories specifically for automatic transmission listed in Figure 3.

¹¹³ “Complaint” at ¶ 273.

¹¹⁴ “Complaint” at ¶ 289.

¹¹⁵ “Complaint” at ¶¶ 168-304

¹¹⁶ <https://www-odi.nhtsa.dot.gov/downloads/flatfiles.cfm> (NHTSA Flat Files Downloaded on 11/19/2021)

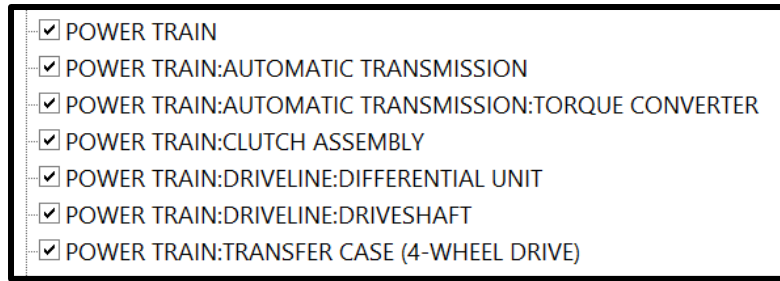


Figure 3. Sample of power train VOQ component categories in NHTSA database.

78. In the VOQs provided by Plaintiffs, the component for which the owner was complaining was not limited to the “power train” or “automatic transmission”. The list of systems included in the complaints Plaintiffs selected are listed in Figure 4. VOQ examples selected by Plaintiffs and included in their “Complaint” demonstrate that owners who complain of vibration can attribute the problem to vehicle components other than the automatic transmission, including the engine, service brakes, steering, suspension, and wheels.

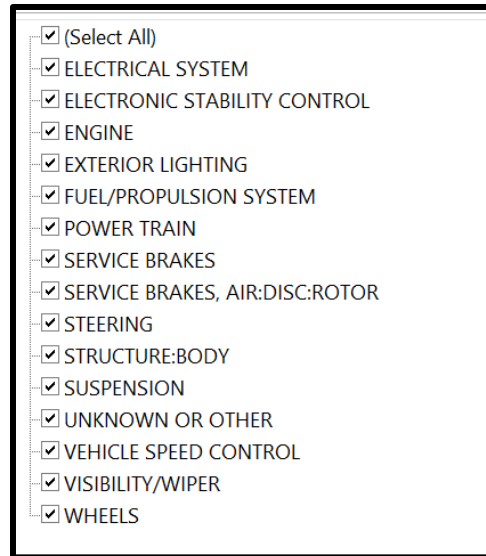


Figure 4. List of Components by Which Owners Categorized Their NHTSA VOQ complaint from the VOQ Collection Selected by Plaintiffs.¹¹⁷

79. NHTSA is well aware of transmission-related consumer complaint conditions related to harsh shift and shudder as evidenced by more than 20,000 manufacturer TSBs issued for those specific issues (see ¶ 68 supra.)
- a. However, NHTSA has initiated no defect investigations for transmission shudder or harsh shift conditions (see ¶ 72 supra.)
 - b. There have been no recalls for automatic transmission shift harshness (see ¶ 71 supra.)
 - c. There has been a single recall associated with automatic transmission shudder as a related effect; however, the transmission shudder was not the cause of the recall. The shudder was caused by coolant intrusion into the automatic transmission case and contamination of the ATF. With use,

¹¹⁷ “Plaintiffs’ Complaint” ¶¶ 168-304 and <https://www-odi.nhtsa.dot.gov/downloads/flatfiles.cfm> (NHTSA Flat Files Downloaded on 11/19/2021)

the contaminated ATF could be expelled and present a risk of fire. It was the risk of fire that presented the unreasonable risk, not the transmission shudder (see ¶ 70 supra.)

- d. An objective observer of NHTSA's institutional behavior regarding complaints of transmission shudder and harsh shifts would conclude such conditions are not considered to be performance deficiencies or problems that present an unreasonable risk to motor vehicle safety.

80. The remaining Named Plaintiffs who were deposed in this matter reported upon their operating experiences with class vehicles. Their testimony regarding whether they have been involved in collisions due to transmission failures or malfunctions is summarized in Appendix 5 hereto. None reported having been involved in a collision due to the alleged transmission defects.

82. Transmission shudder and harsh shift events are conditions that consumers subjectively observe and evaluate. The transmission shift harshness and shudder conditions about which some consumers may object can be technically assessed, measured, and parametrically characterized. GM has done this in its own investigations of the phenomena at issue in the instant dispute. In no dimension of assessment, including analyses of Named Plaintiffs' personal experiences; GM's technical analyses of cause, effects, and corrective actions; and NHTSA's historic approach to such failures and malfunctions, is an unreasonable risk to motor vehicle safety documented. Whatever the complaint conditions may be as regards transmission shift harshness and shudder, such complaint conditions are not considered to be safety defects that

present an unreasonable risk to motor vehicle safety and require a recall remedy to provide a reasonable level of safety.

The Vehicle Development Process (VDP) and Defect Investigations

Systems Engineering and the VDP

81. A motor vehicle development process (VDP) must contain multiple basic underlying elements that serve as building blocks for the VDP and define the overall process; these building blocks are:
- a. Definition of overall vehicle level physical and performance requirements (vehicle size and capacity, powertrain application(s), cabin layout and occupant accommodation, technology content, emissions controls and fuel economy, cooling, aerodynamics, vehicle mass, content costs, investment costs, engineering costs and others). Many imperatives and requirements are competing and may be mutually exclusive at some level;
 - b. Structural requirements (strength, durability, safety, and reliability) to which a vehicle is to be designed, developed, validated, and certified and the noticeably consumer features (design, haptic qualities) function, and fit;
 - c. Requirements for dynamic response characteristics to driver control inputs and roadway conditions;
 - d. Satisfaction of regulatory and legal requirements (emissions, fuel economy, and safety); and
 - e. Technology contenting.
82. Requirements can be both physical and functional (performance related) in nature. Examples of physical requirements are: Component weight, overall dimensions, powertrain packaging requirements, etc. Functional requirements

are defined as vehicle level performance specifications under defined operating conditions for evaluation and or testing. Such functional requirements are commonly established by vehicle manufacturers based upon institutional experiences with similar components and lessons learned. Prior technical knowledge is applied to disaggregate vehicle level requirements to systems level and component level requirements. These vehicle, systems, and component level requirements are registered as specifications defined in drawings, engineering documents, test procedures and acceptance criteria.

83. Light duty motor vehicles are built from multiple complex systems: Body structure, closures, engine, transmission, drivetrain, suspension, wheels and tires, electrical, restraints, etc.
84. Vehicle systems interact and influence one another through physical contact, data transfer, energy transfer, or materials transfer. A design change to one system can influence other systems, subsystems, or components.
85. Vehicle level requirements must be deconstructed into technical specifications at a systems, sub-system, and component level. The VDP is used to analyze, assess, validate, and certify each specification and requirement. Systems integration in to the VDP is depicted in Figure 5. Requirements are set by vehicle manufacturers (OEMs) at the vehicle level and may be established fully or partially by the OEM at the systems level and component level.

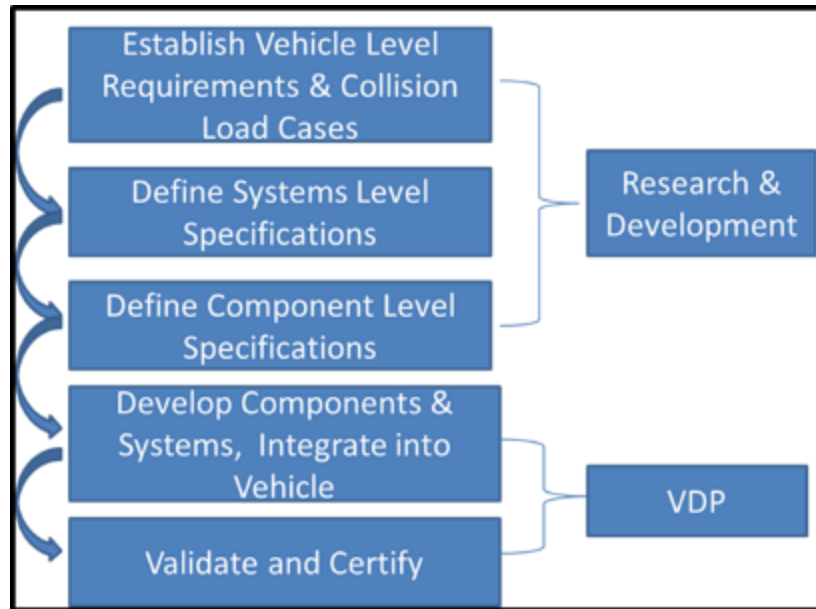


Figure 5. Systems Engineering Requirements Flow Down

86. The vehicle development process can typically involve multiple phases, commonly with an approval gate between each phase.
- a. A planning phase, during which a new product concept is developed, matched to the product portfolio (so as not to overlap with an existing product), matched to the anticipated manufacturing footprint and capabilities including powertrain availability, the market segment is defined and benchmarked, and fundamental engineering requirements are selected. At the end of this phase there is commonly a program description book or document of strategic intent. I wrote program description books at Ford and contributed structures and safety content to strategic intent documents at GM. Supplier partners may be considered and, in some cases, selected at this stage.
 - b. An advanced vehicle engineering phase, during which the basic architectural elements of the vehicle are defined or selected. These include: Landmark dimensions; structural and powertrain layout including engine, transmission, and

drivetrain selections; electrical system; heating and ventilation; collision load case selection; and technology content. Vehicle level requirements are defined, and systems engineering roll down of vehicle level requirements to systems level requirements and to component level requirements are completed.

- c. Program engineering involves one or more phases of component design for manufacture and acquisition for use in prototype vehicle build and testing.
 - i. Designs are often evaluated in computer simulations of actual use conditions as part of the engineering plan to ensure robust performance. Multiple simulations may precede a physical test. Commonly this phase includes a date at which all the component designs' verified data (drawings, mathematical descriptions of parts, requirements and specifications) are released for construction of production tooling.
 - ii. Designs are often evaluated by generation of a "Design Failure Mode and Effects Analysis" (DFMEA), an engineering tool used to identify potential failures, the effects of such failures on product performance registered at the consumer level, and corrective actions that can be applied at the design level on through manufacturing controls to eliminate the potential failure mode or mitigate the effects of such failures.
 - iii. At the end of this engineering phase all of the verified design data is "released" and made available to the supply chain for tooling and component manufacture.
- d. Each program engineering phase requires acquisition of components and systems that can be evaluated in physical

testing for function, fit, and satisfaction of all specifications and requirements. Each program is unique and must satisfy all requirements for function/fit/and finish. Each program must be managed to ensure every vehicle, system, and component level requirement is met. Commonly, a plan is built for each unique vehicle, system, and part to test the element against each applicable specification. The plans commonly include information defining the requirement source (engineering specification engineering drawing, or the like); test conditions, acceptance criteria, the number and conditions of samples to be tested, boggy targets or test to failure; schedules for each test; and finally, test results. Such plans are commonly called the “Design Verification Plan & Report” (DVP&R).

- e. Commonly, prior to final program approval at the end of the development and validation stages, production components manufactured coincident with the “Production Part Approval Process” (PPAP) are assembled at the production assembly plant where the product will be produced for consumers.
- f. At the conclusion of the tooling prove out phase at the assembly plant(s), if all engineering requirements are satisfied and regulatory requirements are certified, production can be authorized to begin.
- g. The purpose of a VDP is to integrate all of the components and systems, ensure satisfaction of all requirements (regulatory and internally created), assure fit/finish/and function of the integrated vehicle, and to identify and resolve problems that may interfere or compromise fit/finish/function considerations or present as failures or malfunctions to consumers. OEMs have problem registration systems to

identify and track problem status to resolution and validation of corrective action.

Development of the GM 8L90 and 8L45 8 Speed Transmissions

GM 8LXX Transmission Architecture and design variations

87. General Motors engineered its Hydra-matic 8-Speed Transmission (8L45/90) and introduced the transmissions in some 2015 model year vehicles.¹¹⁸ The transmissions are fully automatic, 8-speed, rear-wheel drive, and electronic-controlled. “The eight speed ratios are generated using four simple planetary gearsets, two brake clutches, and three rotating clutches. The resultant on-axis transmission architecture utilizes a squashed torque converter, an off-axis pump and four close coupled gearsets. The three rotating clutches are forward of the gearsets to minimize the length of oil feeds and provide enhanced shift response. There are different variants of the transmission, all based on torque capacity. Architecture is common between the variants, and component differences are primarily related to size.”¹¹⁹

88. The 8L45/90 transmission architecture includes a case with integral bell housing; an off-axis, binary vane pump located in the valve body and an externally mounted transmission control module (TCM); three speed sensors for shift selection and accuracy; a four-element torque converter with pump, turbine, a pressure plate splined to the turbine, and stator assembly elements;

¹¹⁸ https://en.wikipedia.org/wiki/GM_8L90_transmission, accessed 10/27/21.

¹¹⁹ General Motors Service Repair Manual Information, Document ID: 3765088, Transmission General Description.

a hydraulic system consisting of a binary vane-type pump, a valve body, and two control valve body assemblies; five multiple-disc clutches; four planetary gearsets, and a park pawl and gear mechanism. The transmissions have nine different gear ratios, eight forward and one reverse. They are longitudinally-mounted, front engine rear-wheel drive transmissions that can be also be adapted to four-wheel drive applications.¹²⁰

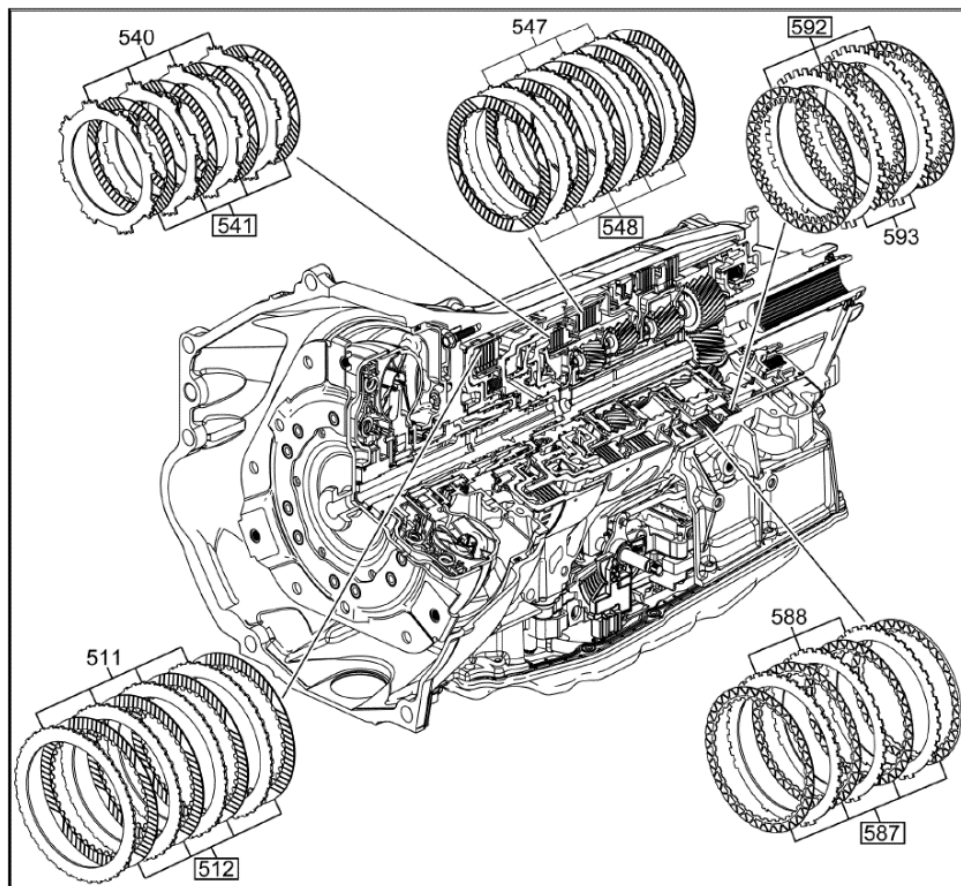


Figure 6. Cross-section of GM Hydra-matic 8-Speed Transmission with Exploded View of Clutch Packs.¹²¹

¹²⁰ Ibid.

¹²¹ General Motors Service Repair Manual Information, Image ID: 4710836

89. The grounding clutches are located rearward of the middle of the structure, outside the gearsets, and are splined to the case. The rotating clutches are located near the front of the transmission, with short oil feed channels to enable rapid shifts.¹²²
90. An oil pressure accumulator can be included in the architecture to support powertrains with an automatic engine stop/start fuel economy technology by ensuring the clutches are actuated with oil pressure for immediate take-off when the engine is re-started from stop.¹²³
91. The 8L45/90 transmission is controlled by a standalone, vehicle-mounted Transmission Control Module (TCM). It has a single 66-way connector to connect with vehicle electrical systems, the transmission assembly, and other vehicle control modules. The TCM sends and receives various input and output signals from multiple switches and sensors in the transmission and elsewhere in the vehicle. The TCM communicates with other electronic control units (ECU's) over a common serial data communication circuit.¹²⁴
92. There are nine control solenoids in the lower valve body. Seven of the solenoids are used to control pressure regulation and direction of transmission fluid, and the remaining two are On/Off solenoid valves used to direct transmission fluid.¹²⁵

¹²² General Motors Press Release, "Cadillac Introduces New 8-Speed Automatic on CT6," dated March 20, 2015.

¹²³ Ibid.

¹²⁴ General Motors Service Repair Manual Information, Document ID: 3931970, Electronic Component Description.

¹²⁵ Ibid.

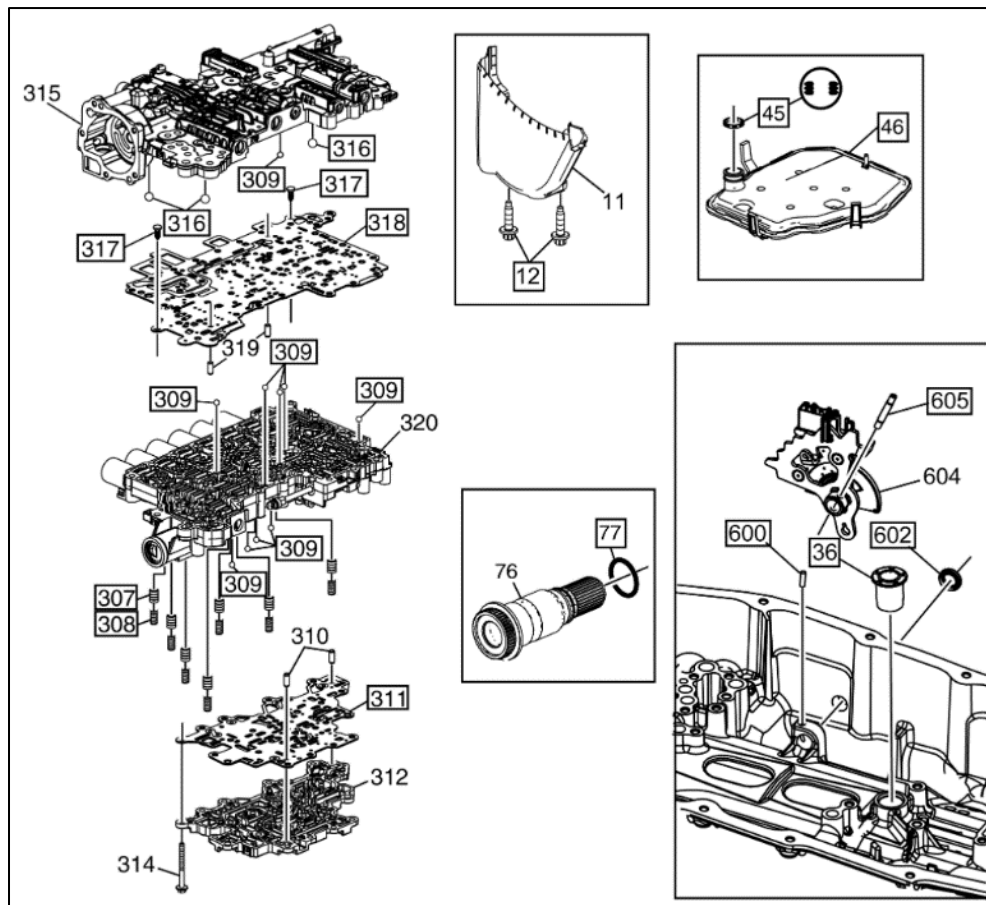


Figure 7. Exploded View of the Valve Body Components.¹²⁶

93. There are three speed sensors that measure and report input, intermediate, and output shaft speeds. All three speed sensors are two-wire hall-effect type sensors that measure rotational speed using a 9-volt square wave output of frequency proportional to the shaft speed at that location.¹²⁷

94. An internal mode switch (IMS) contains six separate switches to sense the transmission range (PRNDL) of the

¹²⁶ General Motors Service Repair Manual Information, Image ID: 4710942.

¹²⁷ General Motors Service Repair Manual Information, Document ID: 3931970, Electronic Component Description.

transmission. One of the switches is a dedicated park/neutral switch, that registers at the engine control module (ECM) to enable start function. The other five hall effect switches are used in combination to define the remaining transmission ranges.¹²⁸

95. The Hydra-matic 8-Speed Transmission is offered in 8L45 and 8L90 variants, which share the above-listed architectural details. The 8L45 is smaller than the 8L90, weighing about 33 pounds less.¹²⁹ The 8L90 has a torque capacity up to 1,000 Newton-meters or about 738 pound-feet.¹³⁰ The 8L45 has a torque capacity up to 550 Newton-meters or about 406 pound-feet.¹³¹

¹²⁸ Ibid.

¹²⁹ General Motors Service Repair Manual Information, Document ID: 3765067, Transmission General Specifications

¹³⁰ GM Authority, "GM 8-Speed 8L90 M5U Hydra-Matic Automatic Transmission," accessed 10/26/21.

¹³¹ GMPowertrain.com, "8L45 Hydra-Matic 8-speed Automatic Transmission," accessed 10/27/21.

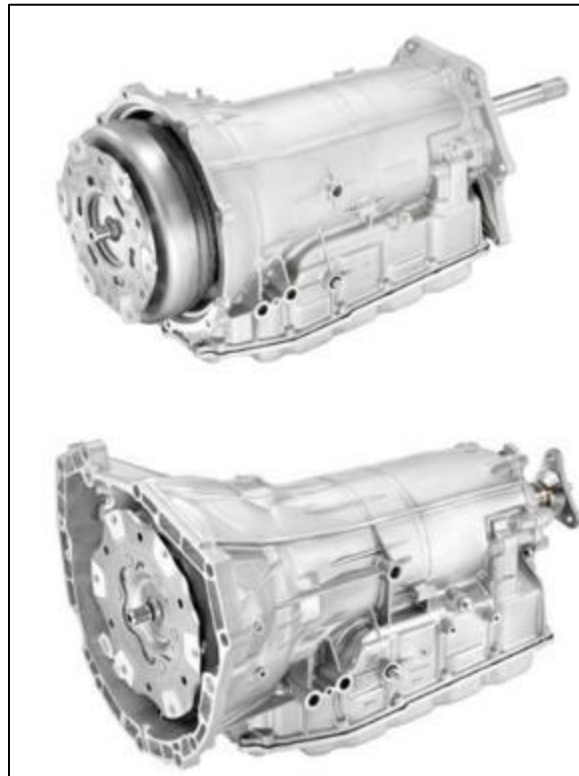


Figure 8. Illustrations of 8L90¹³² (upper) and 8L45¹³³ (lower) variants of the GM Hydra-matic 8-Speed Transmission.

96. The 8L45 is/was used on sports and luxury cars and midsize trucks, while the 8L90 is/was used on full-size trucks, SUV's, sports cars, and luxury cars.¹³⁴ The 8L45 includes provision to support automatic engine stop/start technology and a higher first gear ratio for off-the-line performance.¹³⁵

97. The GM 8L45 and 8L90 transmissions are similar in sharing multiple architectural elements and a general layout of

¹³² GM Authority, "GM 8-Speed 8L90 M5U Hydra-Matic Automatic Transmission," accessed 10/26/21.

¹³³ GM Authority, "GM 8-Speed 8L45 M5N Hydra-Matic Automatic Transmission," accessed 10/26/21.

¹³⁴ GM Authority, "GM 8-Speed 8L90 M5U Hydra-Matic Automatic Transmission," accessed 10/26/21.

¹³⁵ GM Authority, "GM 8-Speed 8L45 M5N Hydra-Matic Automatic Transmission," accessed 10/26/21.

components. However, the transmission designs are not the same and within each design family there exist differences in component calibrations for emission families and fuel economy performance. The calibration elements involve shift timing and control and affect the same elements involved in shift quality. The transmissions are not common in these dimensions and neither Plaintiffs nor their expert will be able to provide to the Court evidence of design and performance common to the putative class.

98. GM's VDP, and development stages for applications of new fuel economy technologies such as the GM 8L90 and 8L45 8-Speed Transmissions generally reflected steps described in ¶¶ 81 – 86 supra. GM's plan for development of the 8L90 and 8L45 8-Speed Transmissions is recorded in "2015 RWD 8 Speed Transmission RPO - M5U (8L90) Y1 BC/AC, A1 LL Analysis Development Validation Plan" produced at GM0004 73238 - GM0004 73260. It is a 26-page document dated 7/28/10 and updated on 1/28/14. Despite its title as exclusive to the 8L90 transmission, the plan explicitly also addresses the 8L45 transmission.¹³⁶

- a. The plan extends over nearly four years from May 2010 to January 2015. There are 23 major milestones listed from Powertrain direction to Start of regular vehicle production.
- b. The DFMEA phase covers all major transmission systems and extends over about 20 months.¹³⁷
- c. Analytical modeling and about 300 specific analyses were planned to address: Steady state and transient fluid dynamics; shift controls, including shift quality; structural elements; mechanical components; lubrication and sealing; thermal

¹³⁶ 2015 RWD 8 Speed Transmission RPO - M5U (8L90) Y1 BC/AC, A1 LL Analysis Development Validation Plan" produced at GM0004 73238 - GM0004 73260 at lines 15, 17, 885, 891 & 892.

¹³⁷ Ibid at lines 31 – 41.

management; pump and filter; torque converter; noise and vibrations.¹³⁸

- d. Noise and vibration development and testing to requirements is performed at several stages with different build levels, Beta¹³⁹ and Gamma¹⁴⁰.
- e. Specific noise (including clunk), vibration, and shudder evaluations were performed,¹⁴¹ all were completed as of the update of the version of the plan document cited herein.
- f. Evaluations related to shift operations were performed.¹⁴²
- g. First gear start tests were performed.¹⁴³
- h. Powertrain & Vehicle Validation Testing, including abuse testing and water ingestion, was planned and performed.¹⁴⁴
- i. The VDP Plan was constructed to engineer to requirements in each performance metric that Plaintiffs seem to have included in their complaint: Shudder, shift quality, noise, and vibration.¹⁴⁵ The resultant transmission designs and performance characteristics may be objectionable to some operators, but they are not the result of a failure to engineer to requirements for those specific characteristics.

99. Additional design variations among putative class transmissions are consequent to particular calibration settings that are uniquely engineered for exhaust emission control. As part of the emission certification and compliance process, the EPA categorizes vehicles into emission families. These families correspond to specific vehicle, engine, and transmission

¹³⁸ Ibid at lines 44 – 347.

¹³⁹ Ibid at line 349.

¹⁴⁰ Ibid at line 382.

¹⁴¹ Ibid at line 341 - 342, 459, 516, 606, 730 - 735, 797 - 798.

¹⁴² Ibid at lines 58 – 66, 85, 87, 89, 91, 97 – 99, 124, 150 – 189, 341, 342, 375, 409.

¹⁴³ Ibid at line 801.

¹⁴⁴ Ibid at lines 901 – 920.

¹⁴⁵ “Complaint” at ¶¶ 4, 6, 97, and 105.

configurations. An emission family can range from one vehicle configuration (make/model/model year/engine/transmission) to several vehicle configurations.¹⁴⁶

100. Emission families are not interchangeable for determining emissions performance. Each family has unique calibrations that differ from other families and each transmission is calibrated for its specific vehicle/emission family application.

101. GM produced two types of documents that describe emission families: A “Certificate of Conformity” and an “Application for Certification”. A total of 173 such documents were produced by GM in this case¹⁴⁷ Each document type pertains to a single model year and one or several vehicles that constitute that common family in that specific model year.

a. The Certificate of Conformity is a high-level summary of the emissions identifiers for a given vehicle. The certificate contains the emission family, the applicable standards group, and a statement of conformity.¹⁴⁸

i. Certificates of Conformity were produced for model years 2015-2021.

ii. A total of 107 Certificates of Conformity were produced defining specific emission families.¹⁴⁹ There were no duplicates in the collection.

¹⁴⁶ <https://www.epa.gov/ve-certification/information-about-family-naming-conventions-vehicles-and-engines>, accessed 11/22/2021.

¹⁴⁷ GM000957020.pdf - GM000964598.pdf.

¹⁴⁸ Ibid.

¹⁴⁹ Ibid.

- b. The Application for Certification reports emission certification related information, including emissions test results, emission family, durability group, evaporative family, and OBD description.¹⁵⁰
- i. Applications for Certification were produced for model years 2015-2021.
 - ii. A total of 66 Applications were produced.¹⁵¹
 - iii. Each application covers one or more emission families.
 - iv. Each emissions family may have multiple transmission calibrations identified with an alphanumeric code.
 - v. After removal of one duplicate, there were 254 unique configurations of emission family, vehicle, engine, and transmission code identified.
102. Transmissions are tuned uniquely for each emission family application. Tuning involves: Shift scheduling across the throttle/load/environmental variables, shift timing, and setting onset and release characteristics. These are all performance responses to the control algorithms engineered to optimize fuel economy, performance, and comfort for a particular emissions family.
- a. The tuning element settings are uniquely established and calibrated to meet the unique requirements on the specific emission family. Design elements of these calibrations affect some of the same variables that affect shift quality and driveability.¹⁵² Thus, a multiplicity of emission families add levels of design complexity to transmission performance.

¹⁵⁰ Ibid.

¹⁵¹ Ibid.

¹⁵² “Driveability” – a term of art in automotive engineering that encompasses all vehicle dynamic conditions as perceived by vehicle occupants that result from: environmental inputs (air flow, roadway, precipitation, and temperature) conditions, vehicle inputs (structures, powertrain, seat, ventilation, closures – doors and windows, tires and wheels), and driver control inputs (accelerator, brake, and steering) while the vehicle is being operated.

- b. Neither Plaintiffs nor their experts will be able to offer proofs of transmission design or calibrations to the Court that are common to the putative class, each transmission design and emission calibration is unique to a specific emission family and there are 254 emission families within the scope of the putative class.

103. Multiple preproduction program status reports indicate that vehicles equipped with the new 8-speed transmissions did not fully satisfy GM's metrics for performance during development phases.¹⁵³ As described in ¶¶ 81 – 86 supra, the vehicle development process involves multiple phases to analyze, assess, validate and certify each specification and requirement.

- a. The "8 Speed RWD Transmission 2015 MY"¹⁵⁴ status report indicates:

- i. "Yellow" status for multiple drivability conditions. In GM's reporting systems, "Yellow" status means the requirements are not fully satisfied. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]¹⁵⁵

- ii. However, in a number of performance metrics, the 2015 Corvette displayed a range of performance ratings some of which were below objective.¹⁵⁶

¹⁵³ "My15 Y1XX LT4 M5U DQ Buyoff" Sept 29, 2014 by Mike Ryba and "8 Speed RWD Transmission 2015 MY M5U Y1XX and K2XX Pilot Re – Valve Powertrain Quality Readiness Review" May 14, 2014.

¹⁵⁴ My15 Y1XX LT4 M5U DQ Buyoff" Sept 29, 2014 by Mike Ryba.

¹⁵⁵ Ibid, at slide 4.

¹⁵⁶ Ibid, at slides 4 – 7, 13 – 19.

iii. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

b. The “8 Speed RWD Transmission 2015 MY M5U Y1XX and K2XX Pilot Re – Valve Powertrain Quality Readiness Review” status report indicates:

i. “Embedded Controller Hardware, Software, Calibration” and “Verification Process” are reported as “Yellow”.¹⁵⁷ Software, and calibration changes were required including the “learn” functions of the transmission. The “learn” functions of the transmission are engineered to affect shift timing and characteristics as a function of driver control inputs and may modify original calibration settings with use. The slides show the “Platform Teams” (that is, the car and truck vehicle integration engineers responsible for vehicle performance) are “aware” and reports the dates the changes will be affected. The slide does not describe the improvements expected to be delivered by the changes.¹⁵⁸

ii. “Drive Quality”¹⁵⁹ is shown as “Yellow”¹⁶⁰ status meaning there was a plan to improve performance to acceptable levels, but the plan details are not registered in the report.

c. Such status reports indicate that prior to distributing the vehicle for sale to the public, GM engineers were actively

¹⁵⁷ In GM’s reporting systems, “Yellow” status means the requirements are not fully satisfied.

¹⁵⁸ “8 Speed RWD Transmission 2015 MY M5U Y1XX and K2XX Pilot Re – Valve Powertrain Quality Readiness Review”, slides 13 and 14.

¹⁵⁹ Ibid, at slide 17.

¹⁶⁰ In GM’s reporting systems, “Yellow” status means the requirements are not fully satisfied.

addressing transmission performance issues that had been identified in the VDP.

104. Shudder and shift dynamics causing undesirable vibrations are not conditions unique to the GM 8L90 and 8L45 automatic transmissions. The technical literature addresses these concerns explicitly¹⁶¹ and each transmission system must be engineered to meet manufacturers' requirements, satisfy physical principles of operation, and as well as possible optimize vehicle performance, customer experiences and fuel economy.

105. The 8L45 and 8L90 transmissions are also arranged specifically to the vehicle platform application. For example, the Corvette has a front-mounted engine, with a central torque tube that connects to a rear-mounted transmission driving the rear wheels, as shown in Figure 10. Other vehicles in the proposed class do not have this drivetrain layout.

- a. Typically, the transmission input shaft is connected directly to the engine's output shaft and both are mounted at the front of the vehicle, without the use of a torque tube to separate these two drivetrain components, for example see the 2017 GMC Canyon configuration as shown in Figure 9.
- b. In vehicles with a selectable 2WD or 4WD option, a transfer case connects the output of the transmission to both the front and rear axles and allows the driver to select if only the rear wheels are driven or if all four wheels are driven, as seen in

¹⁶¹ "Design Practices: Passenger Car Automatic Transmissions, fourth edition, AE-29, SAE Transmission/Axle/Driveline Forum Committee at pages 2-110 to 2-117, 2-132 to 2-136, 6-6, 8-17 & 8-18, 8-59, 8-105, 12-10 to 12-21, 13-21 and "Friction Material for Continuous Slip Torque Converter Applications: Anti-Shudder Considerations" SAE 941031.

the GMC Canyon. A selectable transfer case is not available in the Corvette.

- c. Figure 10 to Figure 14 show the Corvette drivetrain and the cutaway views of the transmission and torque tube.

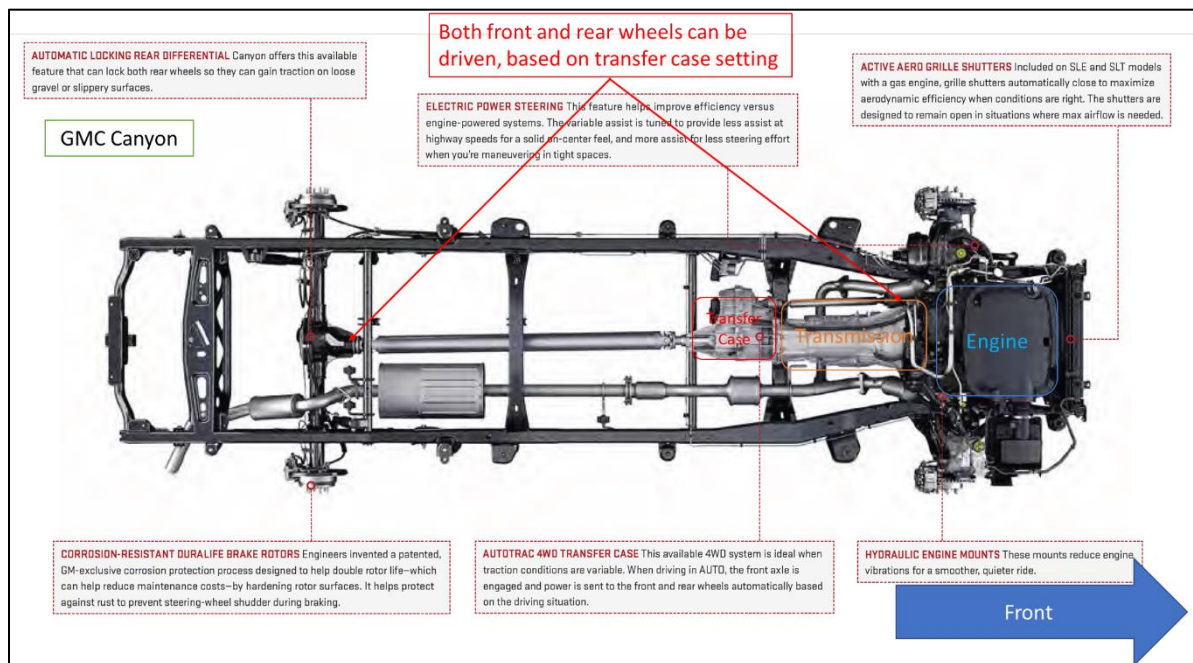


Figure 9. 2017 GMC Canyon drivetrain with components identified.¹⁶²

¹⁶² GMC Canyon 2017 Brochure p.28. Annotations added.

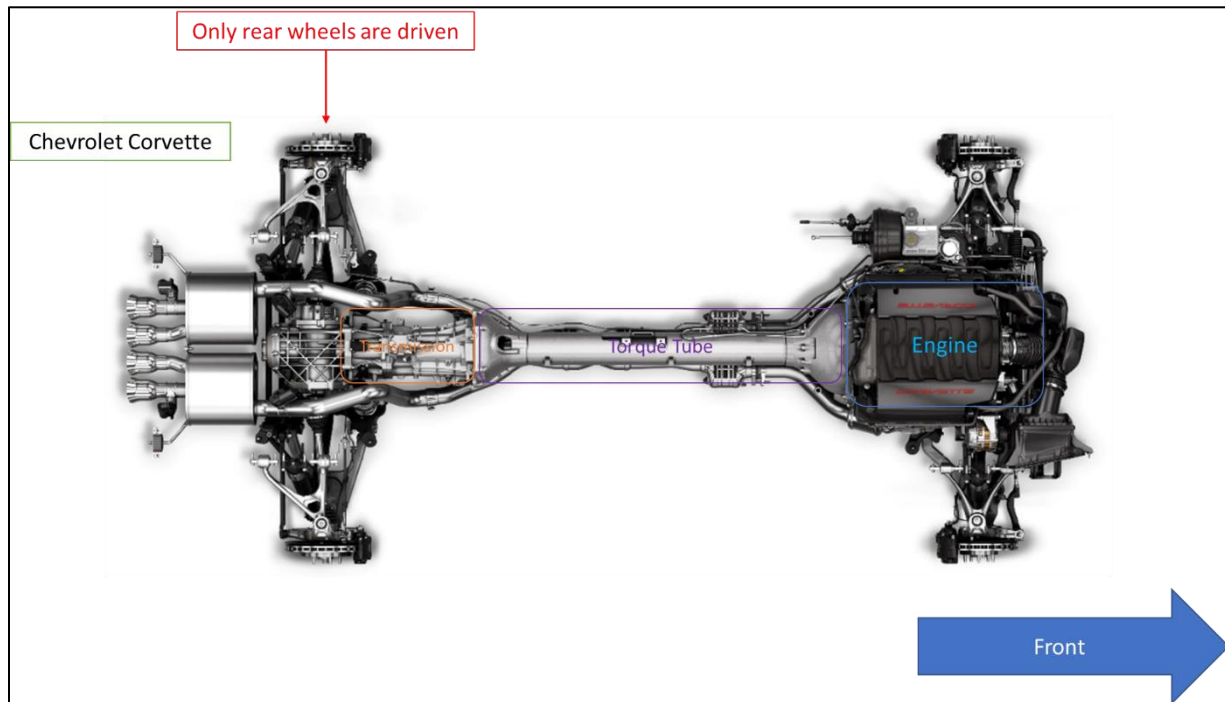


Figure 10. View of the Corvette drivetrain showing the front-mounted engine, the central torque tube connecting to the rear-mounted transmission.¹⁶³

¹⁶³ “10 Awesome Things You Need to Know About the C7 Corvette”, Car and Driver, July 2013, <https://www.caranddriver.com/news/a15370210/10-awesome-things-you-need-to-know-about-the-c7-corvette/>. Annotations added.

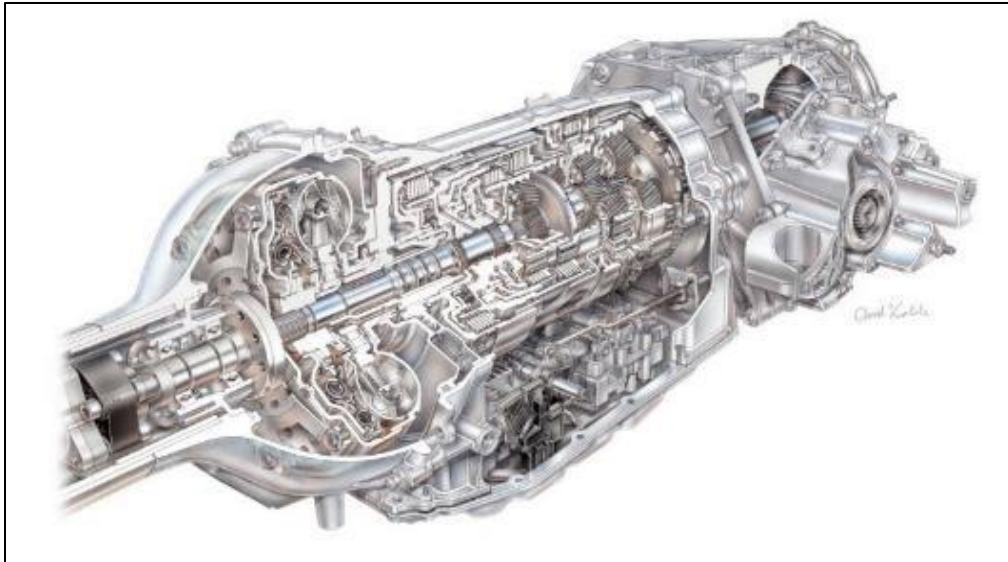


Figure 11. 2015 Corvette 8L90 8-speed transmission.¹⁶⁴



Figure 12. Corvette rear-mounted transmission, wide view.¹⁶⁵

¹⁶⁴ “New 8-Speed Enables Quicker, More Efficient Corvette”, Chevrolet Pressroom, August 2014, <https://media.chevrolet.com/media/us/en/chevrolet/news.detail.html/content/Pages/news/us/en/2014/Aug/0820-8speed/0820-corvette-8-speed-lead.html>.

¹⁶⁵ “2015 Corvette Stingray Will Get The New Eight-Speed Automatic Transmission”, CorvetteBlogger, April 2014, <https://www.corvetteblogger.com/2014/04/07/2015-corvette-stingray-will-get-the-new-eight-speed-automatic-transmission/>.



Figure 13. Corvette rear-mounted transmission.¹⁶⁶



Figure 14. Cutaway view of the Corvette torque tube, connecting the output of the front-mounted engine to the rear-mounted transmission.¹⁶⁷

¹⁶⁶ “2015 Corvette: The Year of the Z06 Part Four”, <https://mobile.corvettestory.com/2015-corvette-4.php>.

¹⁶⁷ Ibid, annotations added.

Analysis of the GM 8 Speed Transmission for Shift harshness.

106. Upon release of the 8-speed automatic transmission in 2015, GM has consistently focused on addressing shift quality through “continuous improvement” efforts. Quality measures and improvement initiatives have been registered in multiple status reports produced in this case. Specifically:

- a. An “8 SPEED WARRANTY IMPROVEMENT PLAN” was produced at GM000213094 describes changes for the 2017 MY through MY 2019 (MY - model year). The 2018 improvements are primarily related to clutch hardware (return springs, seal, regulator valve, and piston bore surface finish) to modify clutch dynamic responses.¹⁶⁸ Software changes were also planned for 2020¹⁶⁹ as described in a similar document “8 Speed Compass/Warranty improvement plan”, produced at GM000997688.pptx.
- b. A “GEN2” 8 speed performance plan is outlined in “8 SPEED GEN II CONSIDERATIONS, DQ Systems Team” produced at (GM000055447).pdf. (DQ – Drive Quality) ■

.¹⁷⁰ These are significant design revisions:

1. [REDACTED] [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

168 “8 SPEED WARRANTY IMPROVEMENT PLAN”, “2016-06-12_H47944-0030-00062130_native
GM000213094”), at slides 9 – 14. and “8 Speed Compass/Warranty improvement plan”, “2017-05-17_H47944-
0106-00000272 (GM000997688).pptx” (also includes MY 2020 plans) at slides 3 – 11.

169 8 Speed Compass/Warranty improvement plan”, “2017-05-17_H47944-0106-00000272 (GM000997688).pptx” (also includes MY 2020 plans) at slides 10 & 11.

¹⁷⁰ GEN2” 8 speed performance plan is outlined in “8 SPEED GEN II CONSIDERATIONS, DQ Systems Team” produced at (GM000055447).pdf at slide 5.

¹⁷¹ Ibid.

- ii. [REDACTED]
- iii. [REDACTED]
- iv. [REDACTED] 174.
- v. [REDACTED] 175.

c. This file includes a matrix of transmission performance characteristics with the GM “Red-Yellow-Green” coding: Red – not acceptable, Green – acceptable, and Yellow – marginal. The “DQTeam” assessment of the then current (August 2018) status. This matrix is shown below as Figure 15.

¹⁷² Ibid.

¹⁷³ Ibid

¹⁷⁴ Ibid

¹⁷⁵ Ibid

	RWD 8 Speed, Gen 1 '15/16/'17	RWD 8 speed, Gen 1 '18/19/20	Gen 2 8L80
Properly sized ratio steps?	3	3	
Properly sized nodal inertias?	2	3	
Properly sized clutch energy capacity?	2	2	
Properly sized clutch Torque Gain?	2	2	
Is clutch friction material appropriate?	2	2	
Do return springs have high enough load?	1	2	
Do return springs have enough slope?	1	2	
Do pistons have high drag seals?	1	2	
Centrifugal compensation?	3	3	
Known compensator centerline pressure?	2	2	
Does Compensator stay filled?	1	1	
Do clutches stay filled (not drain down)?	1	2	
Are clutch stroke volume appropriate?	2	2	
Is clutch control insensitive to supply pressure?	3	3	
Is clutch control insensitive to temperature?	3	3	
Are Clutch Reg valve gains sized appropriately?	2	2	
Are Clutch Reg valve offsets sized appropriately?	3	3	
Attenuate clutch pressure overshoot during overfills?	3	3	
Attenuate clutch pressure undershoot during releases?	3	3	
Is clutch control accurate and repeatable?	2	2	
Isolate solenoid and dirt dither from axle torque?	3	3	
Is clutch control characterization accurate?	2	2	
Clutch control characterized by in-house wet testing?	1	3	
Are controls hardware protected from gearbox debris?	2	2	
Is adequate filtration provided?	2	2	
Is TCC reg valve gain sized appropriately?	2	2	
Can TCC maintain a zero capacity apply mode?	3	3	
Does trans include undeveloped shifting technology?	2	3	
Robust adapt strategy?	3	3	
Overall Rating Out of Possible 87?	62	70	

Figure 15. Operational Conditions of GM 8LXX and Gen 2.¹⁷⁶

107. GM considered the safety effects of transmission shift harshness and prepared a closure document “Transmission Lunge OIR (GM000570775).pdf” “OIR” is a GM acronym meaning “Open Investigation Review”. The scope is defined as “2016-2017 Chevrolet Silverado & GMC Sierra w/ L83 (5.3L Engine) and M5U (8-speed auto Transmission)”¹⁷⁷. [REDACTED]¹⁷⁸

¹⁷⁶ Ibid, at slide 11.

¹⁷⁷ Transmission Lunge OIR - GM000570775 at slide 1.

¹⁷⁸ Failure Mode and Effects Analysis” (FMEA) is an engineering tool used to identify potential failures, the effects of such failures on product performance registered at the consumer level, and corrective actions that can be applied at the design level on through manufacturing controls to eliminate the potential failure mode or mitigate the effects of such failures.

[REDACTED]
[REDACTED] 179 .

a. [REDACTED]
[REDACTED]
[REDACTED] [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 183 .

b. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 185 .

c. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 187 .

¹⁷⁹ Transmission Lunge OIR - GM000570775 at slide 1.

¹⁸⁰ SAE SURFACE VEHICLE STANDARD J1739, JAN2021 at 5.4.1.

¹⁸¹ Ibid, at Appendix A.

¹⁸² Ibid.

¹⁸³ Mr. Hartfelder deposition transcript at pages 84 and 85.

¹⁸⁴ Ibid, at 5.4.3.

¹⁸⁵ Ibid, at Appendix C.

¹⁸⁶ Ibid, at 5.4.2.

¹⁸⁷ Ibid, at Appendix B.

108. Document GM000570775 also records:

- a. T [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]¹⁸⁸
- b. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]¹⁸⁹
- c. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]¹⁹⁰
- d. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

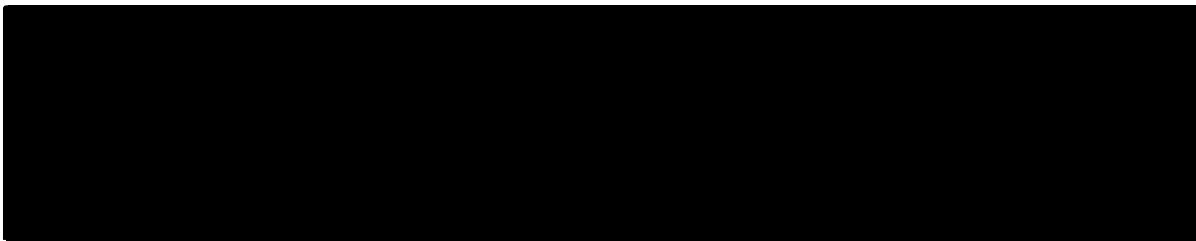


Table 2. Field Data for “Lunge when coming to a stop”.¹⁹³

¹⁸⁸ Transmission Lunge OIR - GM000570775 at slide 1.

¹⁸⁹ Ibid.

¹⁹⁰ Ibid.

¹⁹¹ IPTV – Incidents Per Thousand Vehicles.

¹⁹² MIS – Months-In-Service.

¹⁹³ Transmission Lunge OIR - GM000570775 at slide 1.

- e. [REDACTED]
- f. [REDACTED].¹⁹⁴
- g. [REDACTED]:
 - i. “[REDACTED]:
 - 1. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
 - 2. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
 - ii. “[REDACTED]
 - 1. “[REDACTED]
[REDACTED]
 - 2. “[REDACTED]
[REDACTED]
[REDACTED]
 - 3. “[REDACTED]
[REDACTED]
[REDACTED]
 - iii. “Service Bulletin #16-NA-019 – Released 08/19/2016 - Transmission Service Fast Learn - Correcting Low Mileage Harsh Shifts, Slips, or Flares
 - iv. “Service Bulletin #16-NA-412 2016MY – Released 03/16/2017 - TCM Reprogramming and Transmission Service Fast Learn - Harsh 3-1 Decel Downshift
 - v. “Service Bulletin #16-NA-404 2017MY – Released 04/7/2017 - Transmission Control Module Reprogramming - Harsh Shift, Delayed Shift, Erratic Shifting, Hesitation.

¹⁹⁴ Ibid at slide 2.

- vi. “[REDACTED]
1. “[REDACTED]
2. “[REDACTED]
- [REDACTED]”¹⁹⁵

109. Review of the entire deck of presentation materials provides a richer and more fulsome understanding of the issues.

- a. [REDACTED]
- [REDACTED].¹⁹⁶ This is not an unusual condition for evaluation of vehicle performance characteristics that are essentially subjective assessments of suitability and preference by individual consumers.
- b. The root cause and improvement conditions associated with changes to correct the causal parts are described.¹⁹⁷
- c. Reference materials for complaints and complaint rates, design change records, service actions, and the chronology of the investigation are included as documentation of the status and corrective actions.¹⁹⁸
- d. It is clear that the design conditions of the 2017-2018 MY populations are not uniform as there were six “EWOs” (Engineering Work Orders” for design changes) and three different service actions. Vehicles subject to the succession of EWOs and/or to the service actions do not currently present in the original design condition and putative class is not uniform. Neither Plaintiffs nor their expert will be able to

¹⁹⁵ Transmission Lunge OIR - GM000570775 at slide 1.

¹⁹⁶ Ibid at slide 3 “Discovery”

¹⁹⁷ Ibid at slides 6 - 10, “Root Cause”.

¹⁹⁸ Ibid at slides 11 – 25.

present evidence to the Court of transmission design status and/or repair status that is common to the putative class.

110. The issue was revisited by GM in 2020 and a new “OIR” review document¹⁹⁹ dated 2020-02-14, was prepared with updated information. [REDACTED]

[REDACTED]
[REDACTED].

- a. The “OIR” was initiated to address a “... [REDACTED]
[REDACTED]
[REDACTED]”²⁰⁰.
- b. [REDACTED]
[REDACTED]²⁰¹.
- c. [REDACTED]
[REDACTED]²⁰².
- d. [REDACTED]
[REDACTED]
[REDACTED]^{204 205}.
- e. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]²⁰⁶.
- f. [REDACTED]

¹⁹⁹ 2020-02-14 Transmission SurgeLurch OIR (GM000550032).pdf

²⁰⁰ N19-228256 2014-2019 K2XX Surge-lurch complaints SFADA 2020-2-20 (GM000992101).pdf, slide 1.

²⁰¹ Ibid at slide 1.

²⁰² Ibid.

²⁰³ Unintentional noise in movement of the solenoid from open to closed positions or the reverse.

²⁰⁴ 2020-02-14 Transmission SurgeLurch OIR (GM000550032).pdf at slide 1.

²⁰⁵ Ibid at slides 6 – 19.

²⁰⁶ Ibid at slide 2.

- i. [REDACTED]
[REDACTED].²⁰⁷
- ii. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].²⁰⁸
- iii. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].
- iv. [REDACTED]
[REDACTED].²¹⁰
- v. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

²⁰⁷ Ibid at slide 6.

²⁰⁸ Ibid at slides 7 and 8.

²⁰⁹ Ibid at slides 9 and 10.

²¹⁰ Ibid at slides 11 and 12.

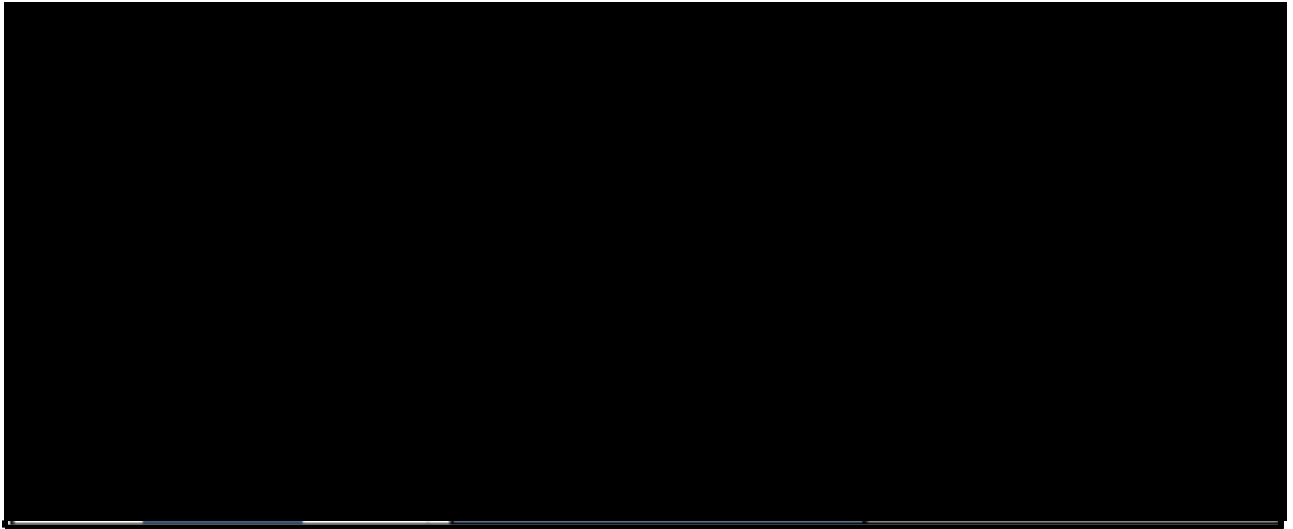


Figure 16. RPTV vs Months-In-Service (MIS) for GM 8LXX Automatic Transmissions as reported 2-14-2020.²¹¹

- vi. The graphs of RPTV vs MIS in Figure 16 show distinctly different patterns as a function of transmission type and MY within a specific transmission type.

- 1.
-
- .213

²¹¹ Ibid at slides 26 – 28.

²¹² Ibid at slide 24.

²¹³ Ibid at slide 26.

2. Type M5X shows similar disparate performance as measured by RPTV at a specific time-in-service. [REDACTED]
[REDACTED]
[REDACTED]. As with the Type M5U, this transmission type also registered disparate performance over time as the product and service improvements were implemented over the period 2015 – 2018.²¹⁴
3. In contrast, the MYC and MYD transmission models show very low complaint rates for shift harshness when new and over time. The [REDACTED]
[REDACTED]
[REDACTED]. Similarly, the MYD model registers low RPTV ([REDACTED]) for shift harshness in all model years and at all TIS measures out to 68 months, nearly six years in service.²¹⁵ These model complaint rate differences (as compared to the M5U and M5X) are reflective of the effects of vehicle and systems integration. The transmissions and vehicle pairings do not all perform the same. Unlike the M5U and M5X, the complaint rates do not discernably grow with TIS.
4. The MW7 model also registers stable and low harsh shift complaint rates for all model years 2014 – 2020, generally around [REDACTED] and most under

²¹⁴ Ibid.

²¹⁵ Ibid at slide 27.

- . These model complaint rate differences (as compared across models) are reflective of the effects of vehicle and systems integration. The transmissions and vehicle pairings do not all perform the same.²¹⁶
5. The MF6 model also registers stable and low harsh shift complaint rates for all model years 2018 – 2020, generally less than ■. These model complaint rate differences (as compared across models) are reflective of the effects of vehicle and systems integration. The transmissions and vehicle pairings do not all perform the same.²¹⁷
6. Table 3 below registers some of the disparate complaint rates for some of the model years (MY) of production. Differences over time and across models are apparent.

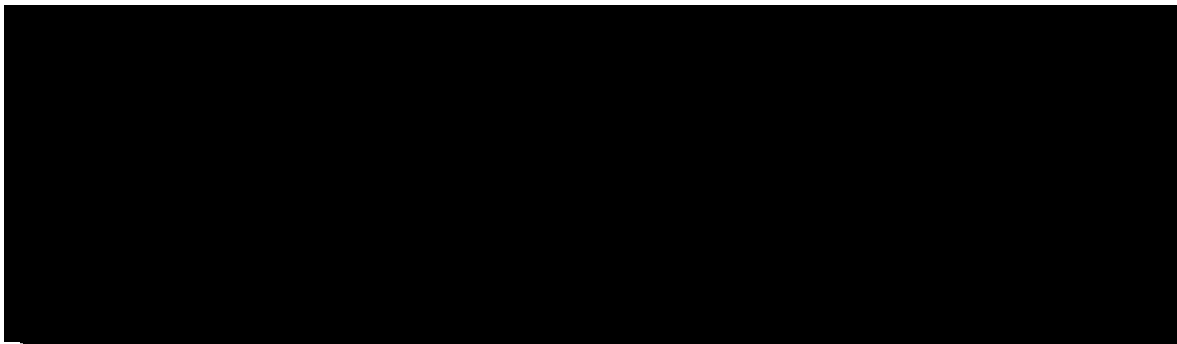
A large black rectangular box redacting the content of Table 3.

Table 3. Selected 8LXX Harsh Shift Complaint Rates By Model and MY.

²¹⁶ Ibid at slide 28.

²¹⁷ Ibid at slide 28.

- g. The steps of continuous improvement in design are reported graphically in a timeline reproduced below as Figure 17. The engineering improvements and resultant product changes extend over the period 2015-2018. The timeline registers multiple changes and shows the production population and complaint rates over time. Improvements in complaint rates (the blue line graph in Figure 17) are apparent with application of product improvements for harsh shift.²¹⁸

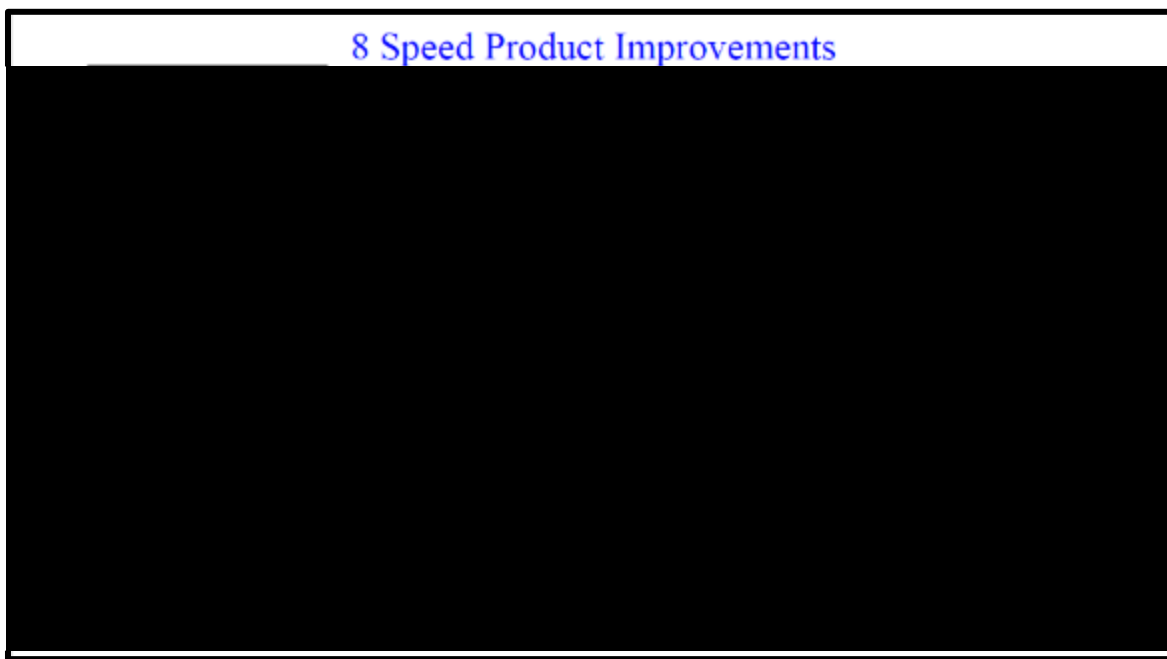


Figure 17. OIR Report February 14, 2020, Harsh Shift Product Improvements²¹⁹

- h. Service actions to address harsh shifts are listed. The Service Bulletins issued for shift harshness are shown in Figure 18:

²¹⁸ Ibid at slides 30 – 35.

²¹⁹ Ibid at slide 30.

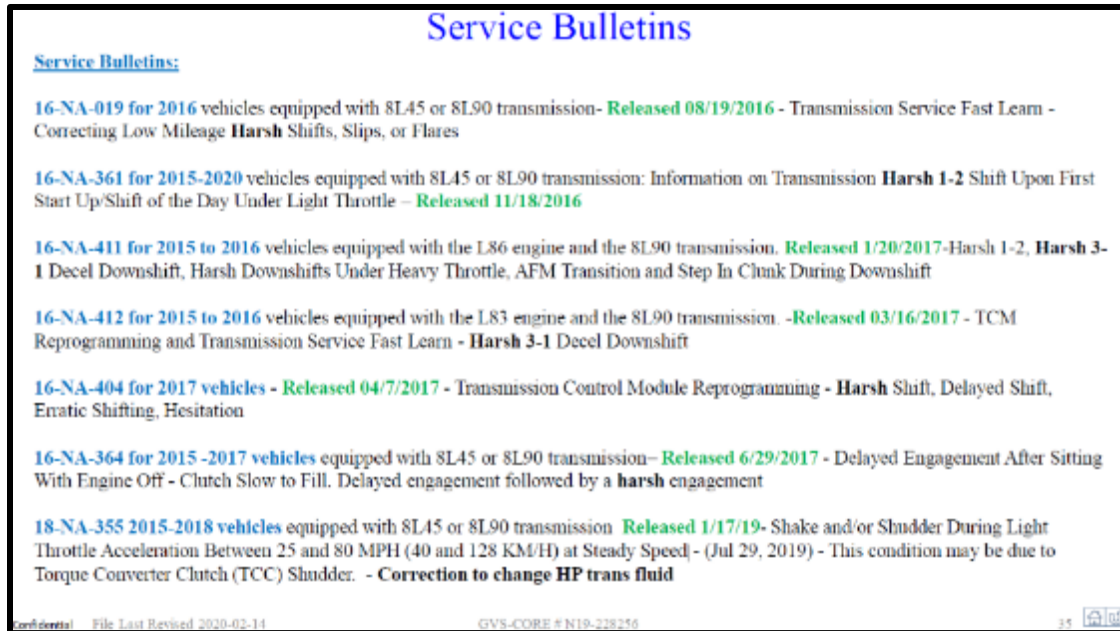


Figure 18. GM 8LXX Transmission Service Bulletins to Address Harsh Shift Conditions, 2016 – 2018.²²⁰

- i. There is a report of a customer “verbatim” reporting two collisions due to shift harshness. The “verbatim” reads “while braking at low speeds (20-25 mph) my truck surged forward. This sudden acceleration in speed has caused two (2) accidents.”²²¹
 - i. The narrative is inconsistent with the harsh shift condition addressed by GM design and service actions. That harsh shift condition caused an increase in deceleration rate, not a reversal from braking (decelerating) to acceleration, going faster.
 - ii. The narrative is not uncharacteristic of consumer reports in failing to provide detail sufficient to develop a technical understanding of an occurrence.
 - iii. If the narrative is factually correct, the truck accelerated while braking. If that is correct, the narrative reads as a

²²⁰ Ibid at slide 35.

²²¹ Ibid at slide 37.

sudden acceleration event in which the vehicle would increase deceleration rather than a shift harshness event.

- iv. This narrative is unconnected to the issue at hand.
- v. Four decades of research and investigations of sudden acceleration complaints have shown the overwhelmingly common cause is driver pedal misapplication. That cause is consistent with the superficial narrative reported here.
- vi. This narrative does not implicate the shift harshness condition as investigated and reported by GM as having an adverse effect on motor vehicle safety and does not present as evidence of an unreasonable risk to motor vehicle safety.
- j. There are several pages of “verbatim” from “TREAD” reports and “Legal Claims”. None of the narratives appear to be related to an occurrence of harsh shift resulting in a crash.²²²

111. The design, and service repair procedures used to address harsh shift conditions have varied over time and affected the putative class vehicles differently.

112. The harsh shift complaint performance of putative class vehicle models is not uniform and does not grow uniformly over time.

113. Information from GM’s research and analyses of shift harshness or consumer complaint information does not present evidence of common transmission design, service condition, or performance for harsh shifting that is common to the putative class.

²²² Ibid at slides 40 – 46.

Analysis of the GM 8 Speed Transmission for Shudder

114. Shudder is a problem associated with vibration in the powertrain; in the instant case, initiated in the torque converter clutch. Prior to initiation of production as part of its VDP, GM performed multiple vibrational analyses of the 8L45 and 8L90 transmissions in combination with the applicable engine type, and reported the results in various technical reports and summary presentations.²²³ The analyses extended at least from November 2011²²⁴ into July 2019²²⁵.

- a. Powertrain vibrations can be transferred to the vehicle body and possibly be perceived by occupants in the vehicle cabin. Motor vehicles are generally designed such that the natural frequencies of the vehicle body and frame (if there is a frame) are separated from the natural frequencies of the powertrain and by isolating the powertrain from the responsive structure with mounting systems engineered for location and transfer functions so as to minimize the vibrational energy transfer from the powertrain to the vehicle cabin and seat mountings.
- b. Therefore, the fundamental powertrain vibrational frequencies are important parameters in limiting vibrational energy transfer from powertrain to the vehicle cabin. These systems are unique to each engine/transmission/vehicle combination; they must be analyzed and engineered separately for each permutation. These engineering problems

²²³ GM000970072.pdf, GM000971799.pdf, GM000977530.pdf, GM000980853.pdf, GM000981090.pdf, GM000984371.pdf, GM000986032.pdf, GM000986434.pdf, GM000986454.pdf, GM000986474.pdf, GM000986558.pdf, GM000991119.pdf, GM000993800.pdf, GM000993818.pdf, GM000994315.pdf, GM000996778.pdf, & GM000997357.pdf.

²²⁴ GM000970072.

²²⁵ GM000996778.

of vibrational attenuation through design alternatives are vehicle integration issues with solutions unique to each engine/transmission/vehicle model combination.

115. GM's vibration analysis of these transmissions (8L45 and 8L90) with different engine types, register first and second natural frequencies correspond to lateral and vertical bending modes and the third natural frequency corresponds to twisting mode.²²⁶ These natural frequencies vary by each engine type:

- a. The first natural frequency for 8L45 transmission can be as low as 119 Hertz²²⁷ (Hz) for 8L45 transmission with LGX engine²²⁸ and as high as 184 Hz for 8L45 transmission with LTG engine²²⁹.
- b. The second natural frequency for 8L45 transmission can be as low as 130 Hz for 8L45 transmission with LGX engine and 8L45 transmission with HFV6 engine²³⁰ and as high as 214 Hz for 8L45 transmission with LTG engine²³¹.

²²⁶ 8L45 / LTG 2.0 Turbo Powertrain Bending Analysis GM000970072.pdf, 8L45 - LGX - Omega AWD Mount Vibration Analysis — Brace Study GM000971799.pdf, 8L90 / C55 L3B T1xx 4WD Powertrain Bending Analysis GM000977530.pdf, 8L90 — L3B — 2WD — T1XX — POWERTRAIN BENDING ANALYSIS GM000980853.pdf, 8L90 CSS L3B T1XX 4WD - PT BENDING GM000981090.pdf, 8L90 — L3B — 2WD — T1XX — POWERTRAIN BENDING ANALYSIS GM000984371.pdf, 8L90 - LWN - 2WD - POWERTRAIN BENDING ANALYSIS GM000986032.pdf, 8L90 - HFV6 - AWD Powertrain Bending Analysis with 2.5 Kg TVA GM000986434.pdf, 8L90 - HFV6 - AWD Powertrain Bending Analysis GM000986454.pdf, 8L90 - HFV6 - AWD Powertrain Bending & Mount Vibration Analysis with TVA GM000986474.pdf, 8L90 — L86 - AWD Powertrain Bending Analysis GM000986558.pdf, 8L45 / LTG FRF Analysis GM000991119.pdf, 8L45 CSS LSY 2WD — PROPULSION SYSTEM BENDING ANALYSIS GM000993800.pdf, 8L45 CSS LSY ALPHA 4WD - PS BENDING GM000993818.pdf, 8L45 — LDF(CSS,1.5L) — 2WD — GEN1-AVZ15930— PS MOUNT BOSS STIFFNESS ANALYSIS GM000994315.pdf, 8L80 L3B AWD GM000996778.pdf, 8L45 HFV6 AWD Powertrain Bending Analysis with 2 kg PT TVA and AFM TVA GM000997357.pdf.

²²⁷ “Hertz” a measure of vibrational frequency; one Hertz (Hz) = one cycle per second.

²²⁸ 8L45 HFV6 AWD Powertrain Bending Analysis with 2 kg PT TVA and AFM TVA GM000997357.pdf at page 7.

²²⁹ 8L45 / LTG 2.0 Turbo Powertrain Bending Analysis GM000970072.pdf at page 6.

²³⁰ 8L45 HFV6 AWD Powertrain Bending Analysis with 2 kg PT TVA and AFM TVA GM000997357.pdf at page 7, 8L45 - LGX - Omega AWD Mount Vibration Analysis — Brace Study GM000971799.pdf at page 9.

²³¹ 8L45 / LTG 2.0 Turbo Powertrain Bending Analysis GM000970072.pdf at page 6.

- c. The third natural frequency for 8L45 transmission can be as low as 209 Hz for 8L45 transmission with LSY engine²³² and as high as 341 Hz for 8L45 transmission with LSY engine²³³.
 - d. The first natural frequency for 8L90 transmission can be as low as 93 Hz for 8L90 transmission with L3B engine²³⁴ and as high as 179 Hz for 8L90 transmission with LWN engine²³⁵.
 - e. The second natural frequency for 8L90 transmission can be as low as 100 Hz for 8L90 transmission with L3B engine²³⁶ and as high as 210 Hz for 8L90 transmission with LWN engine²³⁷.
 - f. The third natural frequency for 8L90 transmission can be as low as 185 Hz (for 8L90 transmission with L3B engine)²³⁸ and as high as 189 Hz (for 8L90 transmission with L3B engine)²³⁹.
116. These analyses report first mode (lateral) bending from 93 Hz to 184 Hz; second mode (vertical) bending from 100 Hz to 214 Hz; the third mode (torsional) bending from 185 Hz to 341 Hz. Neither Plaintiffs' nor their experts will be able to provide to the Court data and information about the specific vibrational sensitivities and dynamic responses of vehicles that is common to the putative class.
117. GM identified shudder vibrations reported by consumers to be associated with the Torque Converter Clutch (TCC),

²³² 8L45 CSS LSY ALPHA 4WD - PS BENDING GM000993818.pdf at page 10.

²³³ 8L45 CSS LSY 2WD —PROPULSION SYSTEM BENDING ANALYSIS GM000993800.pdf at page 9.

²³⁴ 8L90 CSS L3B T1XX 4WD - PT BENDING GM000981090.pdf at page 9.

²³⁵ 8L90 - LWN - 2WD - POWERTRAIN BENDING ANALYSIS GM000986032.pdf at page 9.

²³⁶ 8L90 CSS L3B T1XX 4WD - PT BENDING GM000981090.pdf at page 9.

²³⁷ 8L90 - LWN - 2WD - POWERTRAIN BENDING ANALYSIS GM000986032.pdf at page 9.

²³⁸ 8L90 CSS L3B T1XX 4WD - PT BENDING GM000981090.pdf at page 9.

²³⁹ 8L80 L3B AWD GM000996778.pdf at page 7.

specifically “nonlinear vibration instability due to a negative friction curve on the torque converter clutch.” “Shudder vibration occurs at the clutch interface while the clutch is slipping.”²⁴⁰

- a. GM identified shudder vibrations to be caused by a “negative friction curve slope” that “leads to TCC or Driveline Shudder (Stick-Slip Phenomenon)” and observed significant friction curve degradation in the presence of water in the case of 8-speed Dexron HP & “Option-B” ATFs.²⁴¹
- b. GM found humidity measured by dew point correlates with seasonal and geographic trends across 8RWD transmissions and across the original Dexron HP and Option-B ATF formulations.²⁴²
- c. GM outlined potential solutions to TCC shudder caused by moisture ingestion including: Contaminate separation via condensation chamber (dehumidifier), filtration of air contamination, elimination via a sealed system, and mitigation venting alternatives,²⁴³ as well as using alternative ATFs (such as GTL Mod1a) that have a positive friction curve slope by design and are impervious to known issues.²⁴⁴

118. In 2016 GM outlined a program to “quantify and compare” the effects of water sensitivity of various ATF formulations on TCC performance. The focus was on 8L90 258mm torque converters, WFP6300 friction material, and Dexron HP (212-B) ATF to address the shudder warranty claims on full-sized trucks and SUVs.²⁴⁵

- a. GM wrote “Dex HP and Option B are (more highly) sensitive to water when compared to another fluid (ULV)”²⁴⁶

²⁴⁰ “2018.08.28.GM000235446_X014936-PROD0008 (A)”, at slide 13.

²⁴¹ Ibid, at slide 20.

²⁴² H47944-0030-00027665 (GM000462395), at slide 22.

²⁴³ Ibid, at slide 24.

²⁴⁴ 2018.08.28.GM000235446_X014936-PROD0008 (A), at slide 20.

²⁴⁵ 2018.07.31.GM000055667_X014838-P0006 (A) (Color), at slide 4.

²⁴⁶ Ibid, at slide 12.

- b. GM provided recommendations to “replace Dexron HP with a formulation that is robust to water and environmental humidity contamination at a level similar to Dex-VI. GTL formulations from Infineum meet this recommendation.”²⁴⁷
- c. GM conducted multiple tests to evaluate alternative ATFs including GM 212B, GM Option B, Infineum GTL fluid, Infineum Mod1, Infineum Mod1a, and Infineum Mo.2. The reformulated GTL candidate “Mod2” passed its ZF GK drag test and demonstrated superior a friction gradient (more positive and similar to Option B) throughout test with no EOT shudder observed at 20C, 30C, 40C, 60C, 70C, 90C, 110C and 120C.²⁴⁸
- d. Based on the tests conducted by GM, GTL Mod.2 has been by GM for further development and validation in 2020MY 8-speed applications.²⁴⁹

119. GM considered the transmission torque converter clutch shudder issue in its safety investigation process. [REDACTED]

[REDACTED]

²⁴⁷ Ibid, at slide 25.

²⁴⁸ Tab 8 (Color) - H47944-0022-00079606 (GM000146815), at slide 38.

²⁴⁹ Ibid, at slide 38.

²⁵⁰ 2019-06-17 TCC Shudder SFADA_GM000176538_.pdf at slide 1.

²⁵¹ Ibid.

²⁵² Ibid.

[REDACTED]
[REDACTED] 253


- a. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- b. [REDACTED]

- i. [REDACTED]
[REDACTED]
- ii. [REDACTED]
[REDACTED]
[REDACTED]
- iii. [REDACTED]
[REDACTED]
- iv. [REDACTED]
[REDACTED]
- v. [REDACTED]
[REDACTED]
[REDACTED]
- vi. [REDACTED]
[REDACTED]
- vii. [REDACTED]
[REDACTED]
- viii. [REDACTED]
[REDACTED]
- ix. [REDACTED]
[REDACTED]
[REDACTED]
- x. [REDACTED]
[REDACTED]

²⁵³ Ibid.

xii. [REDACTED]
[REDACTED]
[REDACTED]

C. 

²⁵⁴ 2019-06-17 TCC Shudder SFADA_GM000176538_.pdf at slide 2.

- iii. [REDACTED]
- iv. [REDACTED]²⁵⁹
- e. “[REDACTED]
- i. Ideally the mu/slip-speed curve would have a positive sign, that is always increasing as a function of increasing slip-speed.
- ii. In the instant case, GM determined the water concentration in the DEXRON HP ATF, aspirated through the transmission vent (a vent is a common feature in automotive transmissions) can increase with humidity exposure over time and eventually adversely affect the mu/slip speed curve to the extent the slope of the curve changes from a positive value to a negative value.
- iii. Thus, with increasing slip-speed, the coefficient of friction in the clutch decreases, a performance precisely opposite to the desired relationship.
- iv. The condition is graphically shown in Figure 19.

²⁵⁹ 2019-06-17 TCC Shudder SFADA_GM000176538_.pdf at slide 6.



Figure 19. Clutch Coefficient of Friction (vertical axis) v. Clutch Slip Speed (horizontal axis). The adverse condition of negative slope is the red line in the upper graph. A preferable condition is that of the blue curve on the same graph.

- f. [REDACTED]
[REDACTED]
[REDACTED] 260
- g. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 261
- h. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
- i. “[REDACTED]
[REDACTED]
[REDACTED]

²⁶⁰ Ibid at slide 13.

²⁶¹ Ibid at slide 16.

ii. “[REDACTED]
[REDACTED]

iii. “[REDACTED]

1. “[REDACTED]

2. “[REDACTED]

3. “[REDACTED]

iv. “[REDACTED]

1. “[REDACTED]

2. “[REDACTED]

v. “[REDACTED]

1. “[REDACTED]

2. “[REDACTED]²⁶²

i. Two service bulletins had been issued to address TCC shudder: #16-NA-175 and #18-NA-355. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].²⁶³ Thus there

are three different design levels to consider in evaluating

TCC shudder risk and performance and two different service

repair procedures applied.

j. [REDACTED]

[REDACTED]

[REDACTED]

²⁶² Ibid at slide 18.

²⁶³ Ibid at slide 19.

[REDACTED]

[REDACTED]²⁶⁴

- k. IPTVs are reported in a table reproduced below as Figure 20. IPTV at about 28 MIS varies from about [REDACTED] for 2017 MY Canyon to about [REDACTED] for 2017 MY Cadillac ATS. The effects of vehicle integration and model differences are apparent in rate differences greater than an order of magnitude. The performance of these vehicles is not uniform.

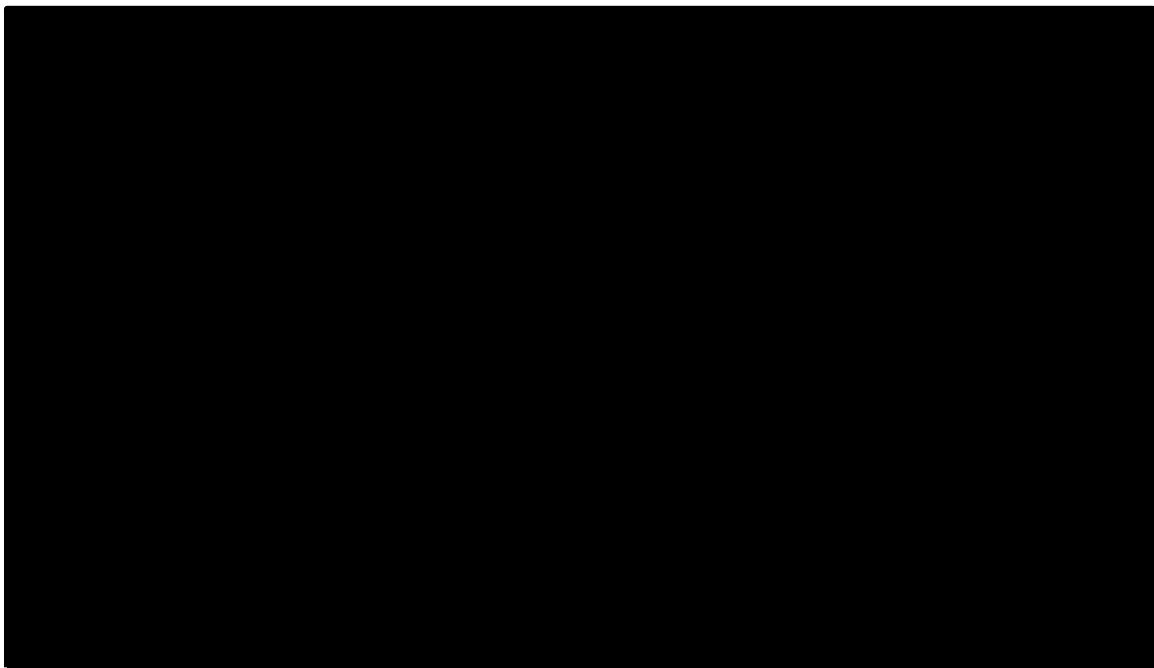


Figure 20. “6/17/2019 Follow Up: IPTV as of 5/8/2019 (Cadillac) and 5/24/2019 (MST) Summary”.²⁶⁵

- l. The potential effects of model year variations for a single architecture are shown in Figure 21, a “Fan Chart” (a GM term) that is similar to the warranty analyses Exponent

²⁶⁴ Ibid at slide 20.

²⁶⁵ Ibid at slide 29.

performed and reported upon at ¶¶ 131 – 137 & 144 –145 infra.

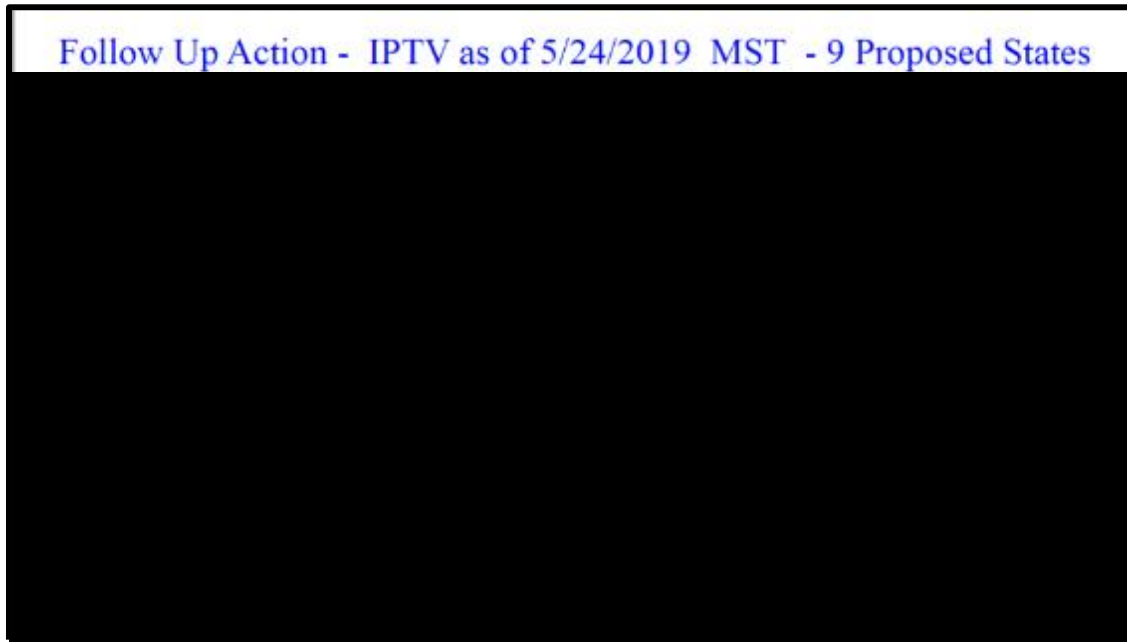


Figure 21. Fan Chart for 2017-2019 MY Colorado/Canyon in 9 High Humidity states.²⁶⁶ Note similar performance for different models on a common vehicle architecture²⁶⁷ and different performance as a function of MY.

m. Broader effects of MY and model are also reported in a more complex Fan Chart reproduced below as Figure 22. This illustrates the variability in complaint rate for TCC shudder. AT 12 MIS there is more than a 50 point spread in IPTV by model, at 24 MIS there is more than a 150 point spread by vehicle model, at 36 MIS there is more than a 200 point spread by model. The vehicle performance for TCC shudder is not uniform across the putative class.

²⁶⁶ Ibid at slide 31.

²⁶⁷ Vehicle architectures – usually models sharing common structures, powertrains, safety, electrical, heating and cooling systems.

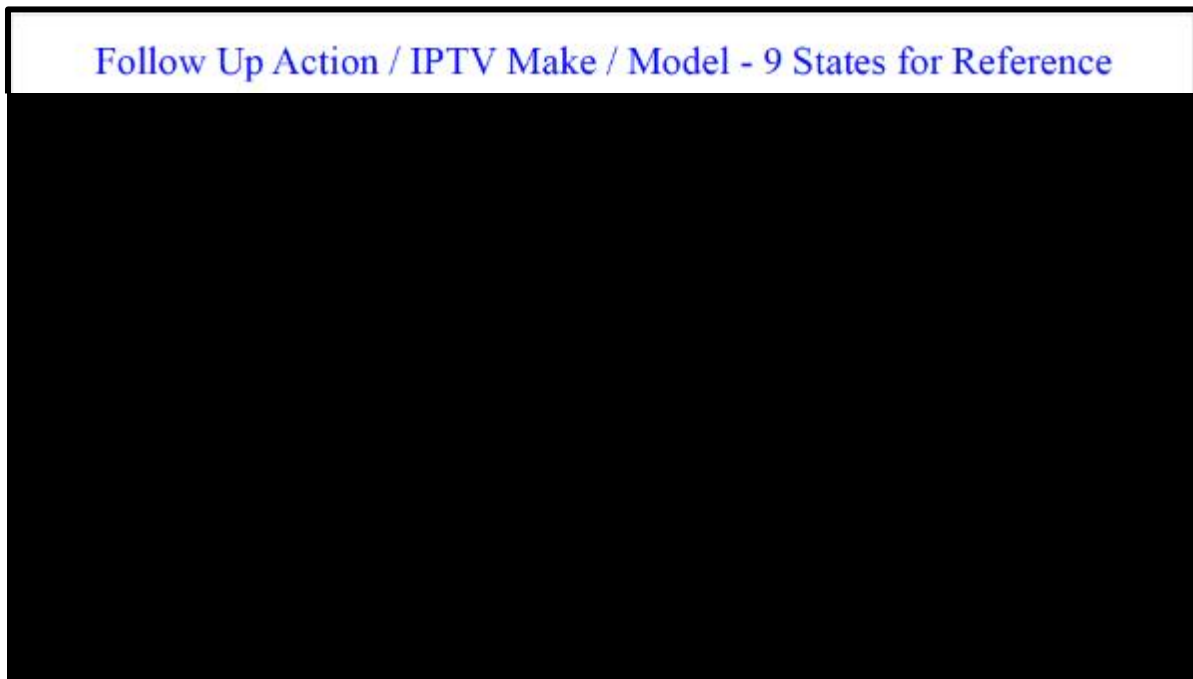


Figure 22. Fan Chart for Putative Class Vehicles.²⁶⁸

120. The design, and service repair procedures used to address TCC shudder conditions have varied over time and affected the putative class vehicles differently.
121. The complaint performance of putative class vehicle models for TCC shudder is not uniform and does not grow uniformly over time.
122. Information from GM's research and analyses of shudder or consumer complaint information does not present of common design, service condition, or performance for TCC shudder common across the putative class.

²⁶⁸ Ibid at slide 35.

Warranty Data Analysis

Background

123. Warranty records reflect owner/operator complaints of vehicle failures or performance anomalies. The registration of a warranty complaint and repair is not by itself evidence that a defect condition exists in common to all vehicles of like model series and model year. Warranty systems are operated to repair the system and part failures that may occur and to restore the subject vehicle to full functionality.
124. Automobile industry warranty data is commonly expressed as the failure rate as a function of time-in-service; i.e., the period between the date of sale and the date of a warranty repair, commonly expressed as “Time-In-Service” (TIS) in months. Rates are then calculated based upon the number of warranty claims for vehicles in an equivalent TIS, divided by the number of vehicles that have reached the equivalent TIS. The denominator is often expressed in units of thousands of vehicles at the particular TIS. The dividend is then expressed as “incidents” (the number of warranty claims) per thousand vehicles or “IPTV”. Sometimes the denominator value is simple a straight count in which case, the quotient is often expressed as a percentage of the subject fleet, %.
- a. However, warranty records may register multiple repairs on a single VIN (for an individual vehicle); unadjusted, for multiple repair claims, an IPTV including all claims will overstate the proportion of the fleet that had experienced a specific failure, anomaly, or malfunction.

- b. In this analysis, to make a clear account of the proportion of the fleet experiencing “shudder” or “shift harshness”, only the first claim that is not excluded for non-qualification reasons related to data integrity as described in ¶ 125 *infra* for each unique VIN, is included in the calculations of IPTV and percentages of the fleet in warranty claim calculations.
125. GM produced warranty records²⁶⁹ and vehicle sales data²⁷⁰ for the putative class vehicles. These data files can be used to measure and report upon the warranty performance and consistency of warranty performance across multiple metrics.
- a. The warranty files are Excel spreadsheets of 40 columns. Among other data, the spreadsheets include information to specify:
- i. Dealer,
 - ii. Vehicle build date,
 - iii. Cause of the problem,
 - iv. Part number for part determined by dealer to be the causal part,
 - v. Customer complaint,
 - vi. Work performed by the technician to correct the problem,
 - vii. The fuel type the vehicle uses,
 - viii. Indicates if the vehicle was a Retail Sale or sold to a Fleet (rental car, company fleet, etc.),
 - ix. The date a Repair Order was completed by the Service Advisor,
 - x. Repair Order number,
 - xi. The date on which the service was completed,

²⁶⁹ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

²⁷⁰ “H47944-0079-00000001.xlsx” (GM000858597).

- xii. Vehicle Brand,
 - xiii. Odometer reading of the vehicle,
 - xiv. Vehicle Model,
 - xv. Vehicle Model Year,
 - xvi. Non-causal part numbers,
 - xvii. Vehicle build plant,
 - xviii. Part Cost without Taxes,
 - xix. Subset of the VIN (check digit, last 6 digits, etc. removed) and used with VIN_MODL_DESGTR as a key to Squish_VIN table to determine plant, Make, Model, Drive, Line Series, etc.,
 - xx. A code that identifies a specific type of service performed,
 - xxi. Vehicle Time In Service in months at the time of repair,
 - xxii. Transaction Category - regular warranty, policy, field actions, etc.,
 - xxiii. The RPO of the Transmission, and
 - xxiv. Vehicle Identification Number.²⁷¹
- b. The warranty data files include repairs included within the warranty period and some repairs outside the warranty period. Claims outside of the warranty period are excluded from all “Time-In-Service” based analyses but are included in the other population based analyses.²⁷²
- c. The warranty data base contains 1,097,491 records.²⁷³
- d. Among other data, the vehicle sales data spreadsheet includes information to specify:
- i. GM Vehicle brand,
 - ii. GM Vehicle Nameplate,

²⁷¹ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

²⁷² Ibid.

²⁷³ Ibid.

- iii. GM Vehicle Model Year,
- iv. Number of like make/model/model year vehicles delivered into the stream of commerce by month,
- v. Month of delivery to the customer,
- vi. State in which the vehicle was delivered,
- vii. Identifying code for the transmission.²⁷⁴
- e. The vehicle sales data base contains 185,176 records and the “Vehicle Count” totals to 2,239,546 vehicles²⁷⁵. The sales are reported by “Division”, “Model”, “Final Delivery Month”, “Vehicle Count” and “State”.²⁷⁶
- f. Some warranty data was probably not valid or was not part of the putative class,²⁷⁷ and such data was excluded:
 - i. Records with Model Year, “MY”, of 2020 or 2021 (26,277 records) were excluded.
 - ii. Records with missing sales date, “SALE DATE” (220 additional records) were excluded.
 - iii. Records with a repair date prior to the sale date (69,268 records) were excluded.
 - iv. Records identified as Express or Savana models were excluded (2,098 records).
- g. Additional warranty data was excluded or adjusted²⁷⁸ for the time-to-failure analyses as inclusion would distort the time-to-failure analyses by overinclusion of failures outside the period of interest.

²⁷⁴ “H47944-0079-00000001.xlsx” (GM000858597).

²⁷⁵ Ibid.

²⁷⁶ Ibid.

²⁷⁷ Similar to the adjustments made by Dr. Wachs in her “Expert Report of Allise Wachs, October 8, 2021, Wesley Won, et. al. v. General Motors, LLC (E.D. Mich.)”.

²⁷⁸ Ibid.

- i. Records with repair date, “JOB_REPAIR_DT”, after July 1, 2021 (2,515 records) were excluded. July 11, 2021 is the last repair date in the warranty data base, indicating that the set of claims for July 2021 is not complete. The time-to-failure rate analyses are performed as of June 30, 2021.
 - ii. Records with a sale month/year that does not correspond to a month/year of sales for the same vehicle model/model year in the sales data (2,346 additional records) were excluded.
 - iii. Claims with zero months in service are assigned one month in service. These claims have a repair date equal to the sale date in the warranty data base.
- h. Claims for vehicles identified as fleet vehicles (rental car, company fleet, etc.) were included in the warranty data analyses. Fleet vehicles are not part of the class, so including such claims will result in an over statement of claim rates if limited to the putative class.
- i. Sales data²⁷⁹ was excluded or adjusted²⁸⁰ to account for vehicles that are not included in the putative class to maintain data integrity.
- i. Records with a model year, “Model Year”, of 2020 or 2021 were excluded (540,801 vehicles).
 - ii. Records with a “Brand Generation” of EXPRESS_GMT6_1X or SAVANA_GMT6_1X were excluded (50,304 vehicles). These vehicles are not included in the putative class.

²⁷⁹ “H47944-0079-00000001.xlsx” (GM000858597).

²⁸⁰ Similar to the adjustments made by Dr. Wachs in her “Expert Report of Allise Wachs, October 8, 2021, Wesley Won, et. al. v. General Motors, LLC (E.D. Mich.)”.

iii. If a vehicle model/model year/sales month-year registered a vehicle sales count that is less than the number of unique VINs in the warranty data base²⁸¹ for that same model/model year /sales month-year, the sales data for were adjusted to a reasonable level. The vehicle sales counts for these model/model years and sales month/years were to match the number of unique VINs in the warranty data base. This adjustment increased the vehicle sales total by 4,862 units.

126. For the purposes of these analyses, vehicle models are grouped by market segment²⁸² as:

- a. Large Pickup segment - GMC Sierra and Chevy Silverado.
- b. Midsize Pickup segment - GMC Canyon and Chevy Colorado.
- c. Large SUV segment - GMC Yukon and Yukon XL.
- d. Large Luxury SUV segment - Cadillac Escalade.
- e. Sport segment – Chevy Camaro.
- f. Luxury Sport segment - Chevy Corvette.
- g. Midsize Luxury Car segment - Cadillac CTS and CT6.
- h. Compact Luxury Car segment - Cadillac ATS.

127. After data exclusions,²⁸³ the warranty data contains 622,421²⁸⁴ unique VINs. After sales data exclusions and

²⁸¹ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

²⁸² Market segment classifications are from “DEFENDANT’S RESPONSE TO PLAINTIFFS’ FOURTH SET OF INTERROGATORIES - RESPONSE TO INTERROGATORY NO. 18”.

²⁸³ See ¶¶ 125.f - 125.g supra

²⁸⁴ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

adjustments,²⁸⁵ unit sales total 1,653,467²⁸⁶ vehicles. Percentages are reported as percent of the adjusted sales population for the specific calculation.

128. Of model year 2015-2018 putative class vehicles equipped with the 212B or Option B automatic transmission fluid, 61.4% have never been taken to a GM dealership for harsh shift or shudder transmission repair.²⁸⁷

- a. Exponent calculated the number of sold vehicles with the 8-speed transmissions that have not been presented for a warranty repair for harsh shift or shudder based upon the GM sale data²⁸⁸ for vehicles sold with the 8L transmissions, and the warranty claims data by VIN²⁸⁹.
- b. 87.7% of MY2015 – MY2018 GM vehicles with 8L transmissions have not registered a warranty claim for harsh shift.
 - i. 86.6% of Cadillac ATSes have not registered a warranty claim for harsh shift.
 - ii. 95.6% of Chevrolet Camaros have not registered a warranty claim for harsh shift.
 - iii. 94.0% of Chevrolet Canyons have not registered a warranty claim for harsh shift.
 - iv. 95.5% of GMC Colorados have not registered a warranty claim for harsh shift.

²⁸⁵ See ¶ 125.i supra

²⁸⁶ “H47944-0079-00000001.xlsx” (GM000858597)

²⁸⁷ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

²⁸⁸ “MY15_17 (GM000875286).xlsx”, “MY18_19 (GM000875285).xlsx” and “MY20_21 (GM000875287).xlsx”

²⁸⁹ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

- v. 94.0 % of Chevrolet Corvettes have not registered a warranty claim for harsh shift.
 - vi. 83.6% of Cadillac CT6s have not registered a warranty claim for harsh shift.
 - vii. 86.8% of Cadillac CTSES have not registered a warranty claim for harsh shift.
 - viii. 69.2% of Cadillac Escalades have not registered a warranty claim for harsh shift.
 - ix. 86.3% of GMC Sierras have not registered a warranty claim for harsh shift.
 - x. 87.8% of Chevrolet Silverados have not registered a warranty claim for harsh shift.
 - xi. 82.0% of GMC Yukons have not registered a warranty claim for harsh shift.
- c. There is variance among putative class vehicles for harsh shift claims. Vehicles in the putative class do not register common performance for shift harshness.
- d. 67.0% of all MY2015 – MY2018 GM vehicles with 8L transmissions have not registered a warranty claim for transmission shudder.
- i. 73.5% of ATSes have not registered a warranty claim for transmission shudder.
 - ii. 73.9% of Camaros have not registered a warranty claim for transmission shudder.
 - iii. 59.5% of Canyons have not registered a warranty claim for transmission shudder.
 - iv. 63.4% of Colorados have not registered a warranty claim for transmission shudder.
 - v. 78.2% of Corvettes have not registered a warranty claim for transmission shudder.

- vi. 71.2% of CT6s have not registered a warranty claim for transmission shudder.
- vii. 71.7% of CTSes have not registered a warranty claim for transmission shudder.
- viii. 48.3% of Escalades have not registered a warranty claim for transmission shudder.
- ix. 71.0% of Sierras have not registered a warranty claim for transmission shudder.
- x. 75.6% of Silverados have not registered a warranty claim for transmission shudder.
- xi. 52.5% of Yukons have not registered a warranty claim for transmission shudder.
- e. There is variance among putative class vehicles for transmission shudder performance. Vehicles in the putative class do not present common performance for transmission shudder.
- f. Proportions of GM vehicles with 8L90 or 8L45 transmissions that have been serviced for harsh shift or for shudder based upon geography (“high humidity” states compared to “other” states) register quite differently in terms of the proportion of the vehicle populations serviced for shudder. GM defined “high humidity” states as: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas.²⁹⁰
 - i. 87.0% of GM vehicles sold in “high humidity” states did not register a warranty claim for harsh shift.

²⁹⁰ Defined by GM in 2019-06-17 TCC Shudder SFADA_GM000176538_.pdf at slides 1, 6, & 13 as Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas. The remaining 41 States are lumped in the analysis as “Other” States.

- ii. 52.6% of GM vehicles sold in “high humidity” states did not register a warranty claim for transmission shudder.
- iii. 88.0% of GM vehicles sold in “other” states did not register a warranty claim for harsh shift, about the same proportion as in “high humidity” states.
- iv. 74.1% of GM vehicles sold in “other” states did not register a warranty claim for transmission shudder, a greater fleet fraction that did not register shudder claims than is presented by the vehicle population in the “high humidity” states.
- g. “Vehicles operating in “high humidity” states registered a larger proportion of the fleet for shudder complaints than do the same vehicles operating in “other” states.

Harsh Shift Claims Analysis

129. Harsh shift related claims for MY2015 – MY2019 vehicles are identified by GM through labor codes that register in column “M” (“SVC_LABR_OPRTB_CD”) of the warranty data base.²⁹¹ The codes used in this analysis are consistent with the report of Dr. Wachs²⁹² and are identified in GM000234854 (“2015-18MY 8 Speed Warranty Claim Counts for Harsh Shift.pptx”) and GM000874751 (“H47944-0089-00000229 (GM 874751; PX118).xlsx”). Labor codes can be useful in analyses of warranty data as they provide an indication of the cause of the problem, malfunction, or failure that occasioned the owner’s complaint and their presentation of the vehicle for repair. In that regard, labor codes can serve as the surrogate measures for the causal element

²⁹¹ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

²⁹² “Expert Report of Allise Wachs, October 8, 2021, Wesley Won, et. al. v. General Motors, LLC (E.D. Mich.)”

of the warranty claim. The specific labor codes for complaints related to shift harshness as listed in Column “M”²⁹³ are:

- a. Control Valve Body (CVB) Replacement or Repair – the CVB is a hydraulic control device that routes pressurized ATF to various components in the transmission to effect gear range selection based on manual control position, engine speed, and vehicle load and to manage changes (gear shifts) among the ranges. These functions are managed by sequential actuation of various electro-mechanical devices (solenoids) in routing the pressurized ATF to apply and release the friction elements within the transmission. These are claims resolved by various levels of replacement or disassembly and repair of the valve body itself.
 - i. 8463690 - Control Valve Body Replacement,
 - ii. 8465650 - Control Valve Upper Body Replacement,
 - iii. 8480648 - Control Valve Body Assembly Disassemble.²⁹⁴
- b. Customer Concern Not Duplicated – these are claims in which a customer complained of malfunction and subsequent technical investigation registered no fault. The customer thought there was a shift too harsh yet, no transmission deficiency was discovered in analysis at the dealership when the vehicle was presented for repair.
 - i. 8469959 - Automatic Transmission - Customer Concern Not Duplicated (CCND),
 - ii. 8449929 - Manual Transmission - Customer Concern Not Duplicated (CCND).²⁹⁵

²⁹³ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

²⁹⁴ GM000234854 (“2015-18MY 8 Speed Warranty Claim Counts for Harsh Shift.pptx”) and GM000874751 (“H47944-0089-00000229 (GM 874751; PX118).xlsx”).

²⁹⁵ Ibid.

- c. ECM²⁹⁶/TCM²⁹⁷ Reprogramming – these are claims addressed by application of software to either the engine control module (ECM - not a component comprehended in the complaint so far as I can see) or the transmission control module (TCM). Such software repairs are applied to update control algorithms and improve performance.
 - i. 2810175 - Transmission Control Module Reprogramming with SPS,
 - ii. 2810155 - Control Solenoid Valve and Transmission Control Module Assembly Reprogramming with SPS,
 - iii. 8480578 - Sequential ECM / TCM Reprogramming
 - iv. 8480598 - Transmission Control Module Reprogramming.²⁹⁸
 - d. Transmission Service Fast Learn Procedure – this is a software supplement intended to update and improve the self-adjusting mechanisms in the transmission control module that govern shift dynamics based upon transmission condition.
 - i. 8480318 - Transmission Service Fast Learn,
 - ii. 8480568 - Drive Learn Procedure.²⁹⁹
130. Overall, for all MY2015 - MY2019 class vehicle model/model year pairings lumped together, the number of claims³⁰⁰ and the proportion of the production population³⁰¹ for unique VINs with a claim for harsh shift related labor codes (expressed as a percentage of the overall population) are:

²⁹⁶ ECM – Engine Control Module, an electronic control system that receives data and power, processes the data and delivers electronic control commands to engine controls for fuel, air, spark, and exhaust aftertreatment.

²⁹⁷ TCM - Transmission Control Module, an electronic control system that receives data and power, processes the data and delivers electronic control commands to the transmission torque converter and valve body controls.

²⁹⁸ GM000234854 (“2015-18MY 8 Speed Warranty Claim Counts for Harsh Shift.pptx”) and GM000874751 (“H47944-0089-00000229 (GM 874751; PX118).xlsx”).

²⁹⁹ Ibid.

³⁰⁰ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907) and ¶ 125.f supra.

³⁰¹ “H47944-0079-00000001.xlsx” (GM000858597) and ¶ 125.i supra.

- a. 74,914 (4.53%) for ECM/TCM Reprogramming, i.e., 45 IPTV.
 - b. 50,953 (3.08%) for Learn Procedure, i.e., 30.8 IPTV.
 - c. 49,548 (3.00%) for Concern Not Duplicated, i.e., 30 IPTV.
 - d. 25,779 (1.56%) for Control Valve Body Replacement or Repair, i.e., 15.6 IPTV.
131. For the purposes of this analysis, and all similar warranty data analyses in this report for putative class vehicles having claims for “harsh shift” or for “shudder”, data summarizing various analyses will follow the same format. Data will be reported on two line-graphs as shown in Figure 23, *infra* and Appendices 6 and 7 hereto. Data tables corresponding to the graphs also appear in Appendices 6 and 7.
- a. Figure 23 is a plot of the cumulative probability of the production population having a shift harshness claim by “Months-In-Service” (MIS)³⁰² and by market segment³⁰³.
 - b. Two line-graphs are included in Figure 23.
 - i. In the graphs shown in Figure 23, each market segment is uniquely identified with a color code in the legend. The two charts³⁰⁴ in Figure 23 have eight color codes (one for each market segment) and correspond to the each of the eight lines plotted on the charts.
 - ii. In other similar fan charts, data is also color coded to identify specific elements of the analysis. The number of specific elements included in each of the analyses vary, but are consistent in format across all of more than 300 analyses that have been completed.

³⁰² The number of months between the vehicle sales date / start of warranty and the repair date or end of warranty. Partial months in service are rounded up to the nearest integer, for example, MIS for a vehicle with a sales date of January 1, 2016 and repair date of March 15, 2015 is 3 months.

³⁰³ Market segments - Large Pickup segment - GMC Sierra and Chevy Silverado; Midsize Pickup segment - GMC Canyon and Chevy Colorado; Large SUV segment - GMC Yukon and Yukon XL; Large Luxury SUV segment - Cadillac Escalade; Sport segment - Chevy Camaro; Luxury Sport segment - Chevy Corvette; Midsize Luxury Car segment - Cadillac CTS and CT6; Compact Luxury Car segment - Cadillac ATS.

³⁰⁴ These are called “fan charts”.

- iii. In each analytical dimension, the detailed data is shown in Appendix 6 for harsh shift and Appendix 7 for shudder.
- iv. The upper chart plots the cumulative warranty claims within each specific market segment as a probability (%) of having an 8LXX transmission warranty claim at each MIS from 1 to 60 for Chevrolet and GMC or from 1 to 72 for Cadillac, or the latest MIS for which complete data is available.
- v. At each MIS for a given segment, the value registered as a “dot” on the chart is the cumulative probability that a vehicle will have a harsh shift related claim by that MIS and is expressed as a percent. The probability calculation is based on the nonparametric Kaplan-Meier estimator.³⁰⁵
- vi. The lower chart is based upon the same data as the upper chart, but the lines of the market segment point estimates (recorded as dots) appear within a color band. The color band represents the values of the upper and lower 95th percentile Confidence Bounds for each point estimate in the market segment.
- vii. 95% confidence bounds calculated from a random sample of a defined population represent a reasonable range of variability that will include the true population value 95% of the time. Here we are considering the warranty process to be an ongoing random process and the observed warranty claims to be a realization or sample from that process. The 95% confidence interval (95% C.I.) represents the range of variability that could be reasonably expected among warranty claims rates as

³⁰⁵ Kaplan, E. L.; Meier, P. (1958). "Nonparametric estimation from incomplete observations". J. Amer. Statist. Assoc. 53 (282): 457–481.

a result of random variation. These analyses use the 95% Nair simultaneous confidence bands³⁰⁶.

- viii. If the confidence bounds overlap among segments, the performance of the overlapping segments may be similar. If the confidence bounds do not overlap, we can conclude the analyses evidence differentiating performance among the different population categories under consideration.
- ix. For example, the red data points for the “Large Luxury SUV” segment are quantitatively easily distinguishable from the green curve for the “Large Pickup” segment and the other curves as well. The failure or malfunction performance for these vehicle market segments are not common but present uniquely for each of the eight segments. Each market segment presents with different warranty claims experience for transmission harsh shift.

³⁰⁶ Nair, V. N. (1984). “Confidence Bands for Survival Functions with Censored Data: A Comparative Study.” *Technometrics* 26:265–275.

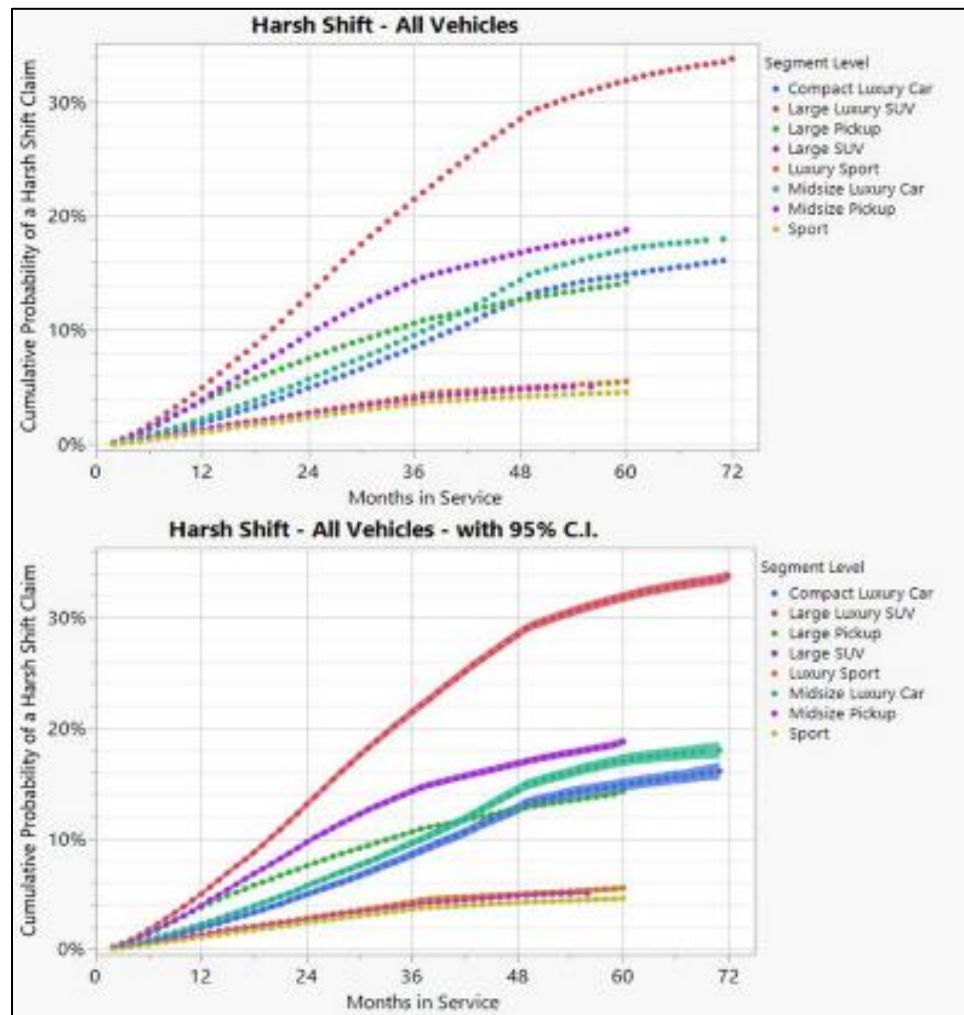


Figure 23. Cumulative claims rates vs MIS for “Harsh Shift” Warranty Repairs and by Market Segment.

- c. Data for each chart at significant MIS milestones is included in Appendix 6 and is reported in a common tabular format reflected in Table 4 *infra*. The population specific to each individual analysis is defined in the title of the table; in this sample case the population is “All Vehicles”, so data is reported for all putative class vehicles.
 - i. The first column on the left of the table identifies the specific vehicle populations or categories selected for analysis; that is the specific sub-populations that are analyzed and reported upon in the table, and plotted in the corresponding chart(s). In this example case, the

sub-populations are the eight market segments defined by GM³⁰⁷: “Large Pickup”, “Midsize Pickup”, “Large SUV”, “Large Luxury SUV”, “Sport”, “Luxury Sport”, “Midsize Luxury Car”, and “Compact Luxury Car”.

- ii. Columns to the right report the cumulative claims rate data for each sub-population reported upon at significant MIS milestones; 12 MIS, 24 MIS, 36 MIS, 48 MIS, 60 MIS, and 72 MIS. Data is not available for every sub-population at every MIS milestone as some of the subject vehicles have not fully matured to six or seven years in service.
- iii. Cumulative claims rates are the values registered at the corresponding MIS for each individual sub-population that was studied.
- iv. The cumulative claims rates are reported as single value point estimates in the table next to the “Estimate” row cells in the second column from the left.
- v. Corresponding 95th percentile confidence bounds appear immediately below each point estimate in the “Lower 95%” and “Upper 95%” cells of the second column. For example, the point estimate for the “Large Luxury SUV” at 48 MIS is 28.5% and the confidence bounds for that specific point estimate are 28.0 – 28.9%.

³⁰⁷ “DEFENDANT’S RESPONSE TO PLAINTIFFS’ FOURTH SET OF INTERROGATORIES - RESPONSE TO INTERROGATORY NO. 18”

		All Vehicles					
		Months in Service					
		12 MIS	24 MIS	36 MIS	48 MIS	60 MIS	72 MIS
Segment Level		Prob.	Prob.	Prob.	Prob.	Prob.	Prob.
Compact Luxury Car	Estimate	1.9%	5.0%	8.6%	12.7%	14.9%	.
	Lower 95%	1.7%	4.7%	8.2%	12.2%	14.3%	.
	Upper 95%	2.1%	5.3%	9.0%	13.2%	15.5%	.
Large Luxury SUV	Estimate	5.0%	13.1%	21.5%	28.5%	31.9%	33.8%
	Lower 95%	4.8%	12.8%	21.1%	28.0%	31.4%	33.3%
	Upper 95%	5.2%	13.4%	21.9%	28.9%	32.3%	34.3%
Large Pickup	Estimate	3.8%	7.5%	10.6%	12.7%	14.3%	.
	Lower 95%	3.7%	7.4%	10.5%	12.5%	14.1%	.
	Upper 95%	3.8%	7.6%	10.7%	12.8%	14.5%	.
Large SUV	Estimate	3.9%	9.7%	14.3%	16.8%	18.8%	.
	Lower 95%	3.8%	9.4%	14.0%	16.5%	18.4%	.
	Upper 95%	4.1%	9.9%	14.6%	17.1%	19.1%	.
Luxury Sport	Estimate	1.3%	2.8%	4.3%	5.0%	5.5%	.
	Lower 95%	1.2%	2.6%	4.1%	4.7%	5.3%	.
	Upper 95%	1.4%	3.0%	4.5%	5.2%	5.8%	.
Midsize Luxury Car	Estimate	2.2%	5.7%	9.6%	14.4%	17.1%	.
	Lower 95%	2.1%	5.5%	9.2%	13.9%	16.5%	.
	Upper 95%	2.4%	6.0%	10.0%	14.9%	17.6%	.
Midsize Pickup	Estimate	1.3%	2.7%	4.0%	4.8%	.	.
	Lower 95%	1.2%	2.6%	3.9%	4.7%	.	.
	Upper 95%	1.4%	2.8%	4.1%	5.0%	.	.
Sport	Estimate	1.1%	2.4%	3.6%	4.2%	4.6%	.
	Lower 95%	1.0%	2.3%	3.5%	4.0%	4.4%	.
	Upper 95%	1.2%	2.5%	3.7%	4.4%	4.8%	.

Table 4. Cumulative claim rates for "Harsh Shift" warranty repairs by Market Segment.

132. Appendix 6 is a collection of similar data and analyses for harsh shift warranty claims for all causes, organized by vehicle type. Each vehicle model was analyzed within the class period 2015 – 2019. There are eleven analyses for harsh shift by vehicle model and model year. We can use this analysis to study the question of commonality in harsh shift performance (for all

causes) at a vehicle level. Figure 24 is illustrative of the vehicle level analysis.³⁰⁸ The data for shift harshness performance at a vehicle level and model year level are not homogeneous across the putative class.

- a. Figure 24 is a plot of the cumulative claim rate for shift harshness vs MIS by model year for Camaro. It shows:
 - i. An increase in shift harshness claims for all causes over model years in MY 2017 compared to 2016;
 - ii. A reduction in shift harshness claims from 2016 & 2017 to 2018; and
 - iii. 2019 and 2018 MYs are approximately the same, both much improved over the warranty levels of 2016 and 2017.

³⁰⁸ See table 5 in Appendix 6 for tabular data.

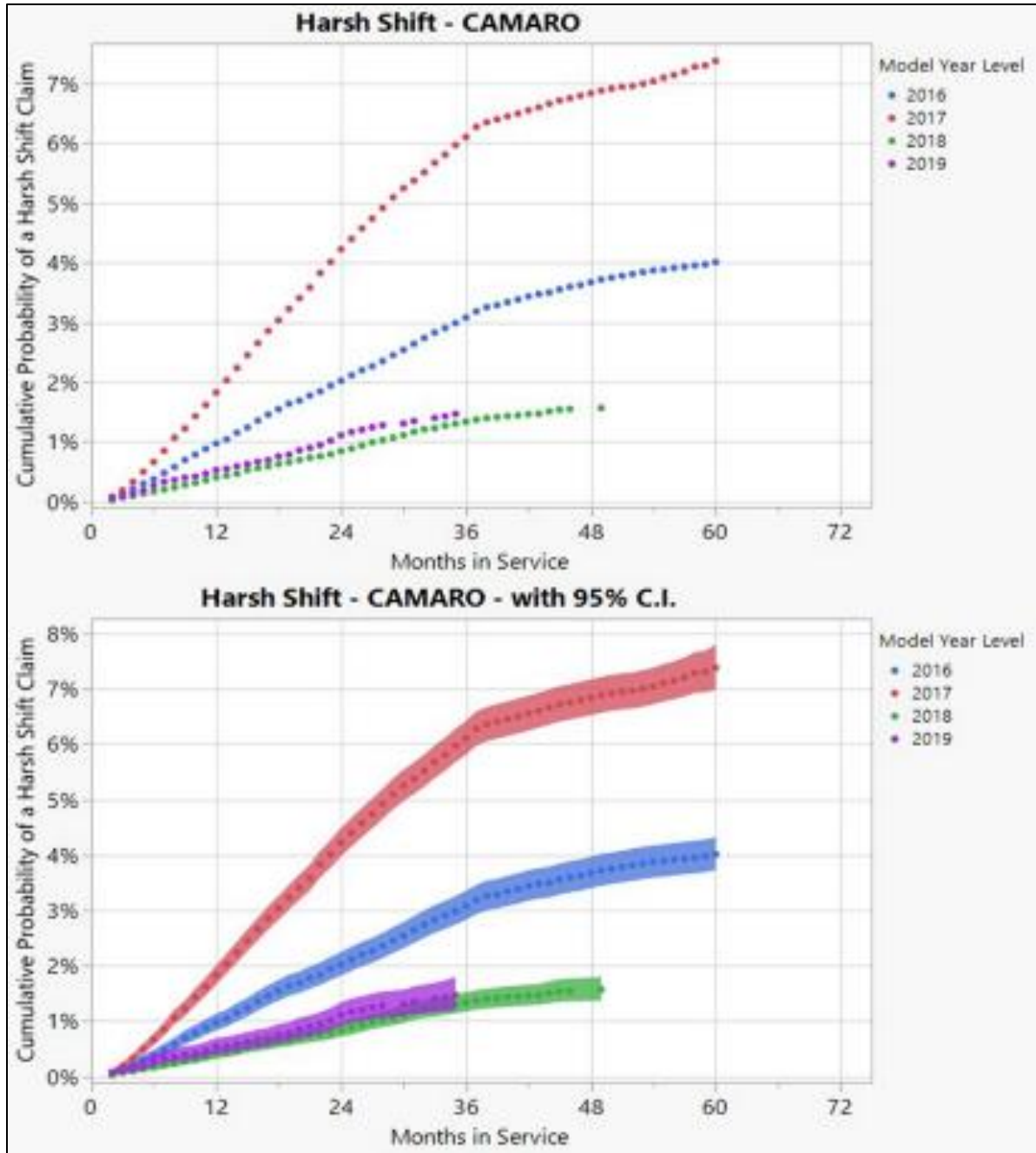


Figure 24. Cumulative claims rates vs MIS for "Harsh Shift" warranty repairs for "Camaro" by Model Year.

- b. Figure 24 registers quantitative data for the shift harshness cumulative claim rate at MIS milestones for Camaro³⁰⁹.
- i. At 12 MIS the harsh shift cumulative claim rate for Camaro varies from 0.4% to 1.8%, a ratio³¹⁰ of 4.5 times.
 - ii. At 24 MIS the harsh shift cumulative claim rate for Camaro varies from 0.8% to 4.2%, a ratio of about 5.3 times.
 - iii. At 36 MIS data was available for only three model years; the harsh shift cumulative claim rate for Camaro varies from 1.3% to 6.1%, a ratio of about 4.7 times.
 - iv. At 48 MIS, data was available for only three model years; the harsh shift cumulative claim rate for Camaro varies from 1.6% to 6.8%, a ratio of about 4.3 times.
 - v. At 60 MIS data was available for only two model years; the harsh shift cumulative claim rate for Camaro varies from 4% to 7.4%, a ratio of about 1.9 times.
- c. Figure 24 also registers quantitative data for the 95% confidence intervals (CI) calculated for the shift harshness cumulative claim rate at MIS milestones for Camaro³¹¹.
- i. At 12 MIS, the harsh shift cumulative claim rate 95% CI for 2017 MY Camaro is 1.7% to 2.0%, and for 2019 MY Camaro the 95% CI is 0.4% to 0.7%. The two different populations' performance are not the same at 12 MIS.
 - ii. At 24 MIS, the harsh shift cumulative claim rate 95% CI for 2017 MY Camaro is 4.0% to 4.5%, and for 2019

³⁰⁹ See table 5 in Appendix 6 for tabular data.

³¹⁰ ratio = high value divided by low value.

³¹¹ See table 5 in Appendix 6 for tabular data.

MY Camaro the 95% CI is 0.9% to 1.3%. The two different populations' performance are not the same at 24 MIS.

- iii. The pattern continues through 48 MIS, the last milestone for which 2018 MY data extends. At 48 MIS, the harsh shift cumulative claim rate 95% CI for 2017 MY Camaro is 6.5% to 7.2%, and for 2018 MY Camaro the 95% CI is 1.4% to 1.8%. The Camaro performance across model years is not the same at 48 MIS and at that point the trends are diverging, not converging to a common level.
 - iv. At 12, 24, and 36 MIS the 2018 and 2019 MY Camaro shift harshness cumulative claims frequency are similar. There are other pairings that also show similar performance in some dimensions. No dimension studied evinced common performance across all the variables: segment, model, model year, or repair code.
 - v. Numerical data for these plots are included in Appendix 6 tables.
- d. Appendix 6 contains parallel analyses for all of the putative class vehicle models; each model differentiates into two or more distinct populations as a function of model year. None of the analyses at the model and model year level are homogenous across the model years.
- e. These analyses show that the cumulative rates of shift harshness claims are not uniform across individual vehicle models, and they vary with MY. This is not surprising in that GM was actively researching shift harshness cause and implementing various design and service corrective actions

over time. The improvements are evidenced in performance differences among model years. See ¶¶ 133 – 135 *infra*.

- f. The data for shift harshness performance at a segment level, model level, and model year level are not homogeneous across the putative class.

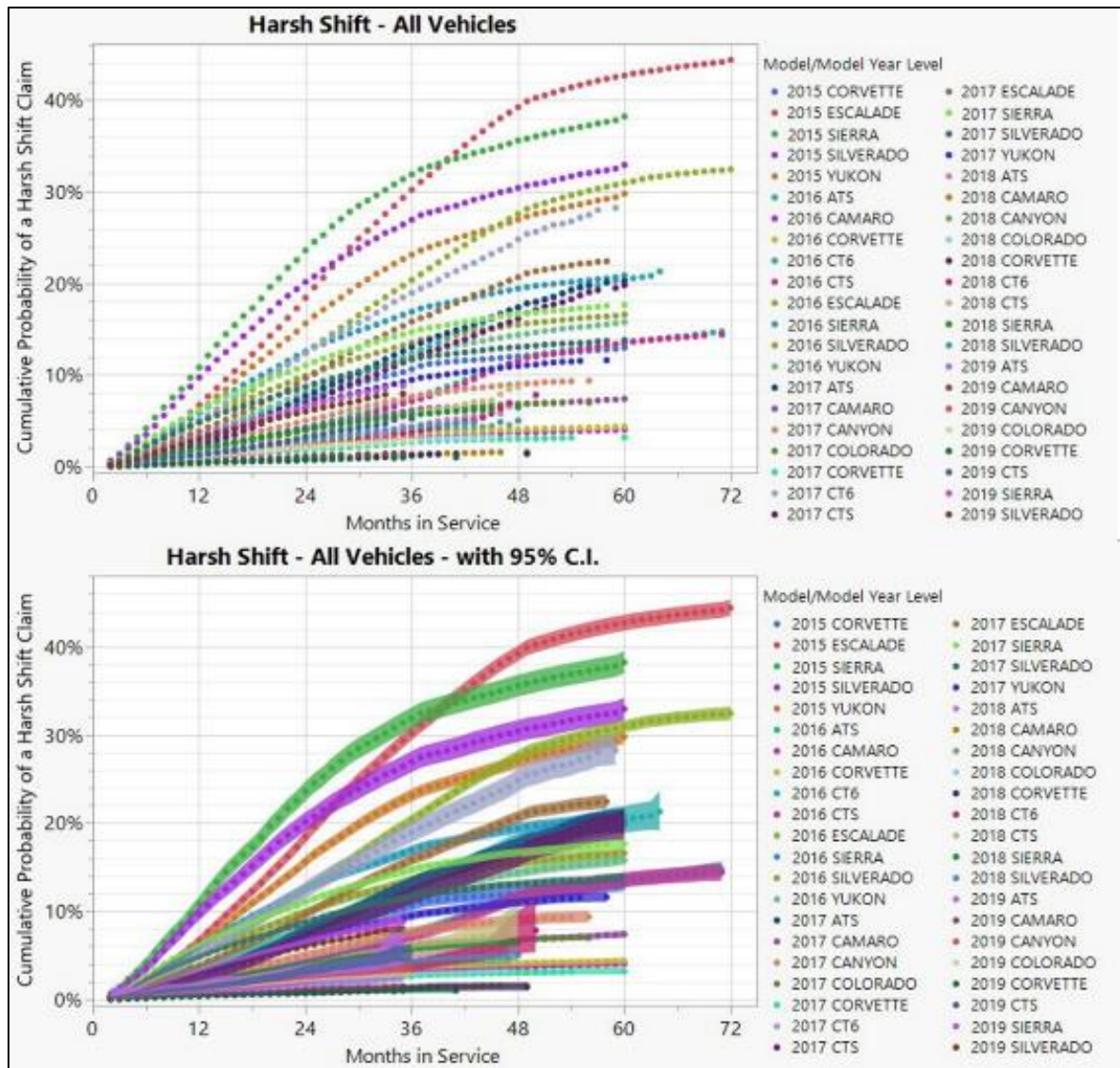


Figure 25. Cumulative claims rates vs MIS for "Harsh Shift" warranty repairs by Model and by Model Year.

133. Across all models / model years that Exponent analyzed for shift harshness, the measured variations are:³¹²
- a. At 12 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 0.4% (2018 Corvette) – 10.8% (2015 Sierra), a ratio³¹³ of 27 times.
 - i. 95% CI for the 2018 Corvette is 0.2% - 0.7%.
 - ii. 95% CI for the 2015 Sierra is 10.0% - 11.7%.
 - b. At 24 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 0.7% (2018 and 2019 Corvette) – 23.6% (2015 Sierra), a ratio of about 34 times.
 - i. 95% CI for the 2018 Corvette is 0.5% - 1.1%.
 - ii. 95% CI for the 2015 Sierra is 22.5% - 24.7%.
 - c. At 36 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 1.0% (2019 Corvette) - 31.9% (2015 Sierra), a ratio of about 32 times.
 - i. 95% CI for the 2019 Corvette is 0.8% - 1.3%.
 - ii. 95% CI for the 2015 Sierra is 30.7% - 33.1%.
 - d. At 48 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 1.4% (2018 Corvette) - 39.2% (2015 Escalade), a ratio of 28 times.
 - i. 95% CI for the 2018 Corvette is 1.0% - 1.9%.
 - ii. 95% CI for the 2015 Escalade is 38.4% - 40.1%.
 - e. At 60 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 3.2 % (2017 Corvette) - 42.7% (2015 Escalade), a ratio of about 13 times.
 - i. 95% CI for the 2017 Corvette is 2.8% - 3.6%.

³¹² See table 3 in Appendix 6 for tabular data

³¹³ “Ratio” = Upper value divided by the lower value.

- ii. 95% CI for the 2015 Escalade is 41.8% - 43.6%.
 - f. The confidence intervals (CI) do not overlap. Identifiable populations within the putative class are not homogeneous for shift harshness performance.
134. Labor codes are indicative of the root cause of a warranty claim as the service entity must enter a labor code as part of the reimbursement process and the codes are configured to enable GM to infer the problem cause. These analyses can thus be further refined by examination of the labor codes used to address customer complaints presented to dealers as shift harshness.
- a. There are four categories of labor codes used in repair records for shift harshness³¹⁴:
 - i. Control Valve Body Replacement or Repair labor codes - 8463690, 8465650, 8480648;
 - ii. Customer Concern Not Duplicated labor codes – 8469959 & 8449929;
 - iii. ECM /TCM Reprogramming labor codes - 2810175, 2810155, 8480578, & 8480598; and
 - iv. Transmission Service Fast Learn Procedure – 8480318 and 8480568.
135. Appendix 6 includes 14 sets of charts and tables detailing variations in cumulative harsh shift claims rates by “labor codes, by vehicle model, and by model year. The plot for all models/model years is included below as Figure 26.”³¹⁵

³¹⁴ See ¶ 130 supra.

³¹⁵ See table 24 in Appendix 6 for tabular data.

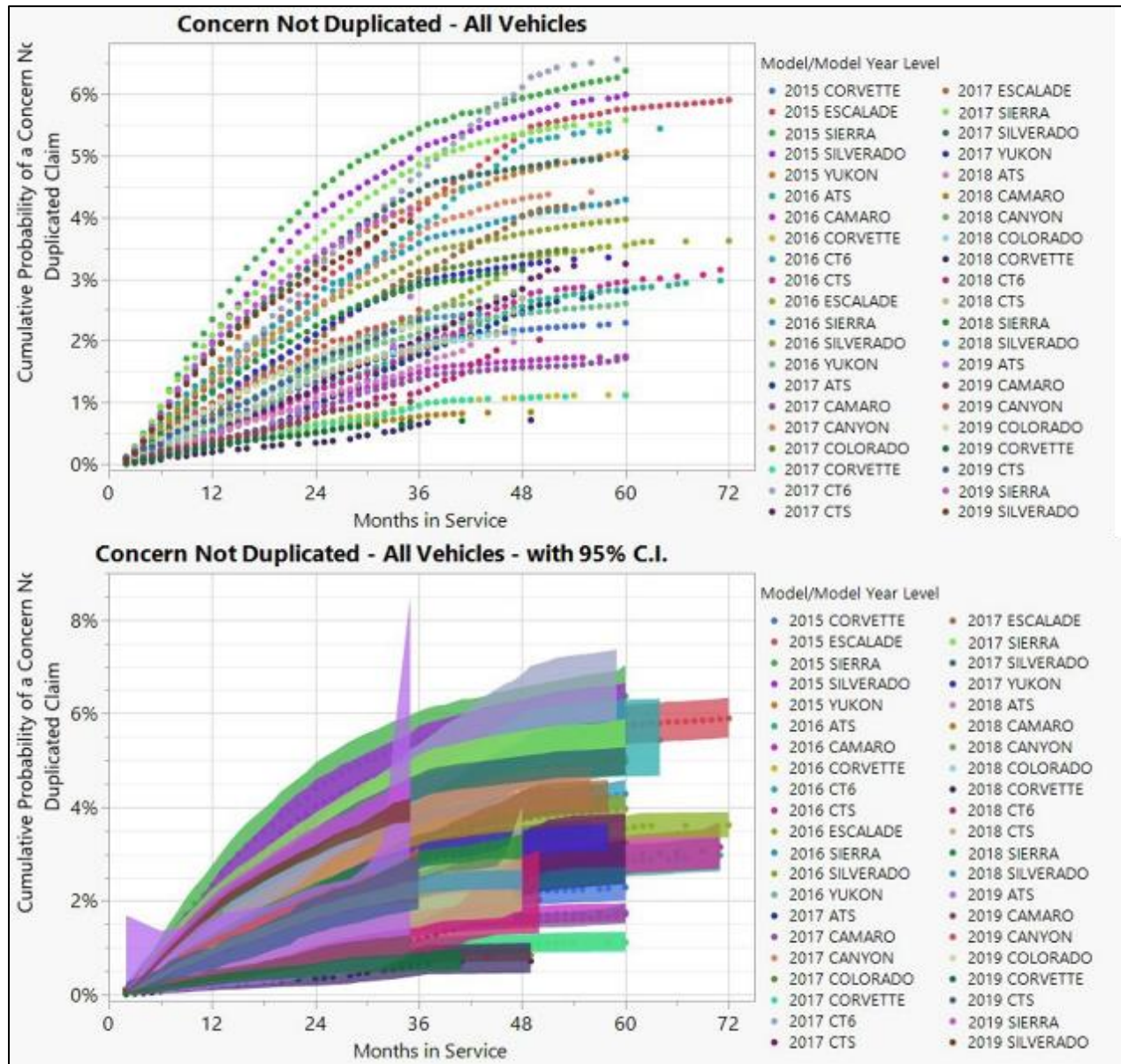


Figure 26. Cumulative claims rates vs MIS for "Harsh Shift" warranty repairs for "Concern Not Duplicated" by Model and by Model Year.

- a. At 12 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 0.2% (2018 Corvette) – 2.3% (2015 Sierra), a ratio of 11.5 times.
 - i. 95% CI for the 2018 Corvette is 0.1% - 0.4%.
 - ii. 95% CI for the 2015 Sierra is 2.0% - 2.8%.

- b. At 24 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 0.3% (2018 Corvette) – 4.4% (2015 Sierra), a ratio of about 14.7 times.
 - i. 95% CI for the 2018 Corvette is 0.2% - 0.6%.
 - ii. 95% CI for the 2015 Sierra is 3.9% - 4.9%.
 - c. At 36 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 0.7% (2019 Corvette) – 5.4% (2015 Sierra), a ratio of about 7.7 times.
 - i. 95% CI for the 2019 Corvette is 0.5% - 0.9%.
 - ii. 95% CI for the 2015 Sierra is 4.9% - 6.0%.
 - d. At 48 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 0.7% (2018 Corvette) – 5.9% (2015 Sierra), a ratio of 8.4 times.
 - i. 95% CI for the 2018 Corvette is 0.5% - 1.1%.
 - ii. 95% CI for the 2015 Sierra is 5.4% - 6.6%.
 - e. At 60 MIS, the range in percent of the fleet with claims for harsh shift for all causes by vehicle model is 1.1 % (2017 Corvette) – 6.4% (2015 Sierra), a ratio of about 5.8 times.
 - i. 95% CI for the 2017 Corvette is 0.9% - 1.3%.
 - ii. 95% CI for the 2015 Sierra is 5.8% - 7.0%.
 - f. The confidence intervals for these model comparisons generally do not overlap. The populations are not homogenous.
136. Similar charts and tables for the other three categories of repair labor codes are included in Appendix 6.
137. Figure 27 is a chart that shows the cumulative percentage (i.e. the probability) of the study population for harsh shift related

claims by transmission type and vehicle model application at equivalent MIS for putative class vehicles.³¹⁶

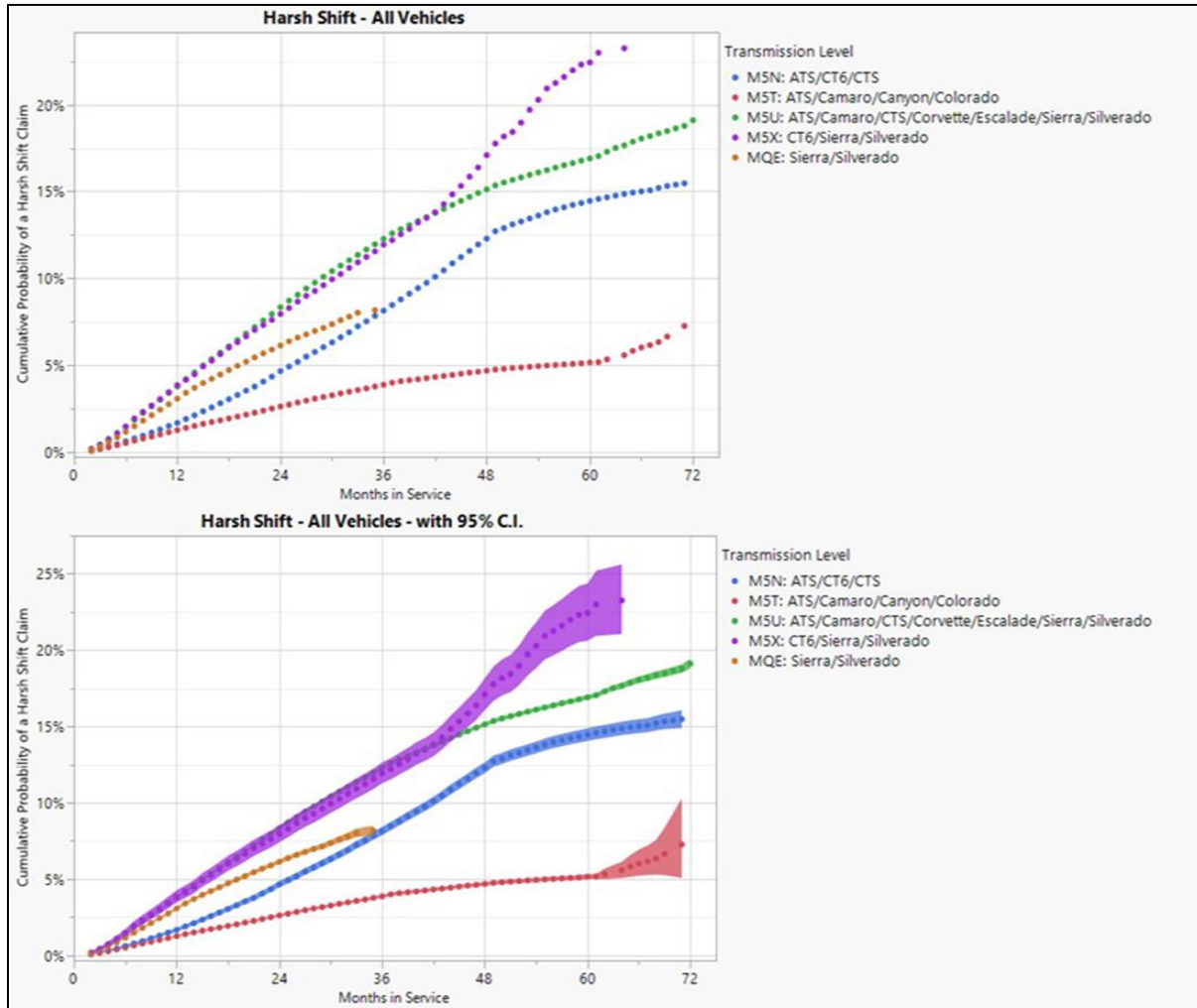


Figure 27. Cumulative claims rates vs MIS for “Harsh Shift” warranty repairs by Transmission.

138. The cumulative harsh shift claim rates at 60 MIS by Transmission type and vehicle application are reported as follows:
- 14.5% for the M5N Transmission (ATS, CT6 & CTS) with 95% CI 14.1% - 14.9%.

³¹⁶ See table 71 in Appendix 6 for tabular data.

- b. 5.2% for the M5T Transmission (ATS, Camaro, Canyon & Colorado) with 95% CI 5.0% - 5.3%.
 - c. 16.9% for the M5U Transmission (ATS, Camaro CTS, Corvette, Escalade, Sierra & Silverado) with 95% CI 16.8% - 17.1%.
 - d. 22.4% for the M5X Transmission (CT6, Sierra & Silverado) with 95% CI 20.6% - 24.4%.
 - e. At 24 MIS, 6.1% for the MQE Transmission (Cadillac ATS, Cadillac CT6, Cadillac CTS) with 95% CI 6.0% - 6.3%, these vehicles have not reached 60 MIS as yet.
139. The service performance of putative class vehicles for shift harshness is not similar across vehicle segments, model years, labor codes, or vehicle models. These measurable performance differences reflect vehicle level influences that are architecture and calibration related. Neither Plaintiffs nor their experts will be able to present evidence to the Court of harsh shift claims performance that is common across the putative class. The probability or likelihood of transmission related consumer complaints for shift harshness is not common to the class, the likelihood of harsh shift complaints is dependent upon model, model year, and repair code (cause of the complaint).
140. Objective quantitative analyses of the performance of putative class vehicles for claims of shift harshness are not homogenous by market segment, by vehicle model, by vehicle model year, or by labor codes for the corrective action taken to repair the vehicle. Every available investigative metric for shift harshness performance registers diversity among the categories of vehicles examined in the analysis. When fully and fairly analyzed

this data plainly illustrates a complex diversity of performance metrics; neither Plaintiffs' nor their experts will be able to manipulate these data into fact-based analyses for presentation to the Court that evince conditions of common performance across the putative class.

141. In considering this data, an objective observer would conclude:

- a. There is no single component at fault for the claims. Some are related to valve body and require replacement of the valve body; some are related to valve body and the valve body can be repaired; some register no problem with the vehicle (CCND codes) and there is no repair required although there is a claim; some are for Transmission Controls Reprogramming, some for the valve body reprogramming, some for Control Solenoid Valve and Transmission Control Module Assembly reprogramming, some for Sequential ECM / TCM³¹⁷ reprogramming; and some simply require a repeat of the Transmission Control Module learning procedures.
- b. These various labor codes reflect different factors as causes of the failures or the malfunctions as perceived by the customer. Failure and malfunction causes are not uniform and solutions to the failure and malfunction causes are not uniform. There is no evidence of harsh shift causation that Plaintiffs will be able to provide to the Court that is common to the putative class.
- c. Some claims of harsh shift reports indicate that the complaint condition cannot be replicated. Evidence of the absence of a problem that can be replicated is not unique or unusual in situations such as this, where the evaluation as to what is objectionable and what is not is largely subjective and may

³¹⁷ ECM/TCM – Engine Control Module/Transmission Control Module.

not always be resolved through service diagnostics and repair.

- d. 8LXX 8 speed automatic transmission warranty claim rates for harsh shift complaints are not uniform across the vehicle types included in the putative class. At 60 MIS, the claim rates for harsh shift by segment are:
 - i. 14.3% for the Large Pickup segment, GMC Sierra and Chevy Silverado. 95% CI for this segment 14.1% – 14.5%.
 - ii. 4.8% for the Midsize Pickup segment, GMC Canyon and Chevy Colorado. 95% CI for this segment 4.7% - 5.0%.
 - iii. 18.8% for the Large SUV segment, GMC Yukon and Yukon XL. 95% CI for this segment 18.4% - 19.1%.
 - iv. 31.9% for the is offered for sale in the Large Luxury SUV segment, Cadillac Escalade. 95% CI for this segment 31.4% - 32.3%.
 - v. 4.6% for the Sport segment, Chevy Camaro. 95% CI for this segment 4.4% - 4.8%.
 - vi. 5.5% for the Luxury Sport segment, Chevy Corvette. 95% CI for this segment 5.3% - 5.8%.
 - vii. 17.1% for the Midsize Luxury Car segment, Cadillac CTS and CT6. 95% CI for this segment 16.5% - 17.6%.
 - viii. 14.9% for the Compact Luxury Car segment, Cadillac ATS. 95% CI for this segment 14.3% - 15.5%.
- e. Confidence intervals for the segments do not all overlap. The putative class is not homogenous.
- f. Variations occur due to vehicle integration differences among the vehicle architectures (mid-size truck, full size pickup truck, mid-size sedans, sport cars). The rates for complaints of harsh shift are not uniform across segments of the putative class.

142. With these facts in mind, it is clear evidence of complaint conditions and defect conditions related to harsh shift conditions are not common to the putative class.

Shudder Claims Analysis

143. Shudder related claims for model year 2015-2019 class vehicles are identified by GM through the labor codes that register in column “M” (“SVC_LABR_OPRTB_CD”)³¹⁸ of the warranty database³¹⁹. The codes used in this analysis are consistent with Dr. Wachs’³²⁰ report and codes are identified in GM000234851 (“2015-18MY 8L90 Warranty Claim Counts for Shudder Related.pptx”) and GM000874751 (“H47944-0089-00000229 (GM 874751; PX118).xlsx”). The specific labor codes for complaints related to shudder as listed in Column “M” are classified as either “Torque Converter Replacement” or “Fluid Flush Only”.³²¹

a. Torque Converter Replacement:

- i. 8464810 - Torque Converter Replacement,
- ii. 8464970 - Torque Converter Fluid Seal Replacement,
- iii. 8480518 - Replace Torque Converter, Filter and Flush Lines, and
- iv. 8480768 - Replace Torque Converter and Change Filter.³²²

b. Fluid Flush Only:

- i. 8480418 - Double fluid Flush,

³¹⁸ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

³¹⁹ Ibid.

³²⁰ “Expert Report of Allise Wachs, October 8, 2021, Wesley Won, et. al. v. General Motors, LLC (E.D. Mich.)”

³²¹ “Copy of ExistingLaborCodes Plus 2 Descriptions 07.19.2021_19204417_v1.xlsx”.

³²² “2015-18MY 8L90 Warranty Claim Counts for Shudder Related.pptx” (GM000234851).

- ii. 8480478 - Flush and Drain Fluids for Transmission Shake and/or Shudder Repair,
- iii. 8480818 - Diagnostic Testing and Fluid Exchange,
- iv. 8480838 - Triple Flush and Drain Fluids for Transmission Shake and/or Shudder Repair, and
- v. 9104582 - N192217820 - Transmission Fluid Exchange.³²³

144. Overall, for all model year 2015-2019 class vehicle model/model year pairings lumped together, the number of claims³²⁴ and the proportion of the production population³²⁵ for unique VINs with a claim for shudder related labor codes (expressed as a percentage of the overall population) are:
- a. 389,284 (23.54%) for Fluid Flush Only.³²⁶
 - b. 72,352 (4.38%) for Torque Converter Replacement.³²⁷
 - c. Appendix 7 is a collection of analyses related to shudder claims by market segment, model, model year and MIS.
 - d. Figure 28 is a plot of the cumulative percentage of the study population (i.e., the probability) for shudder related claims by MIS and by market segment for putative class vehicles.³²⁸

³²³ Ibid.

³²⁴ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907) and ¶ 125.125.f - 125.g.

³²⁵ H47944-0079-00000001.xlsx” (GM000858597) and ¶ 125.i

³²⁶ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907).

³²⁷ Ibid.

³²⁸ See table 1 in Appendix 7 for tabular data.

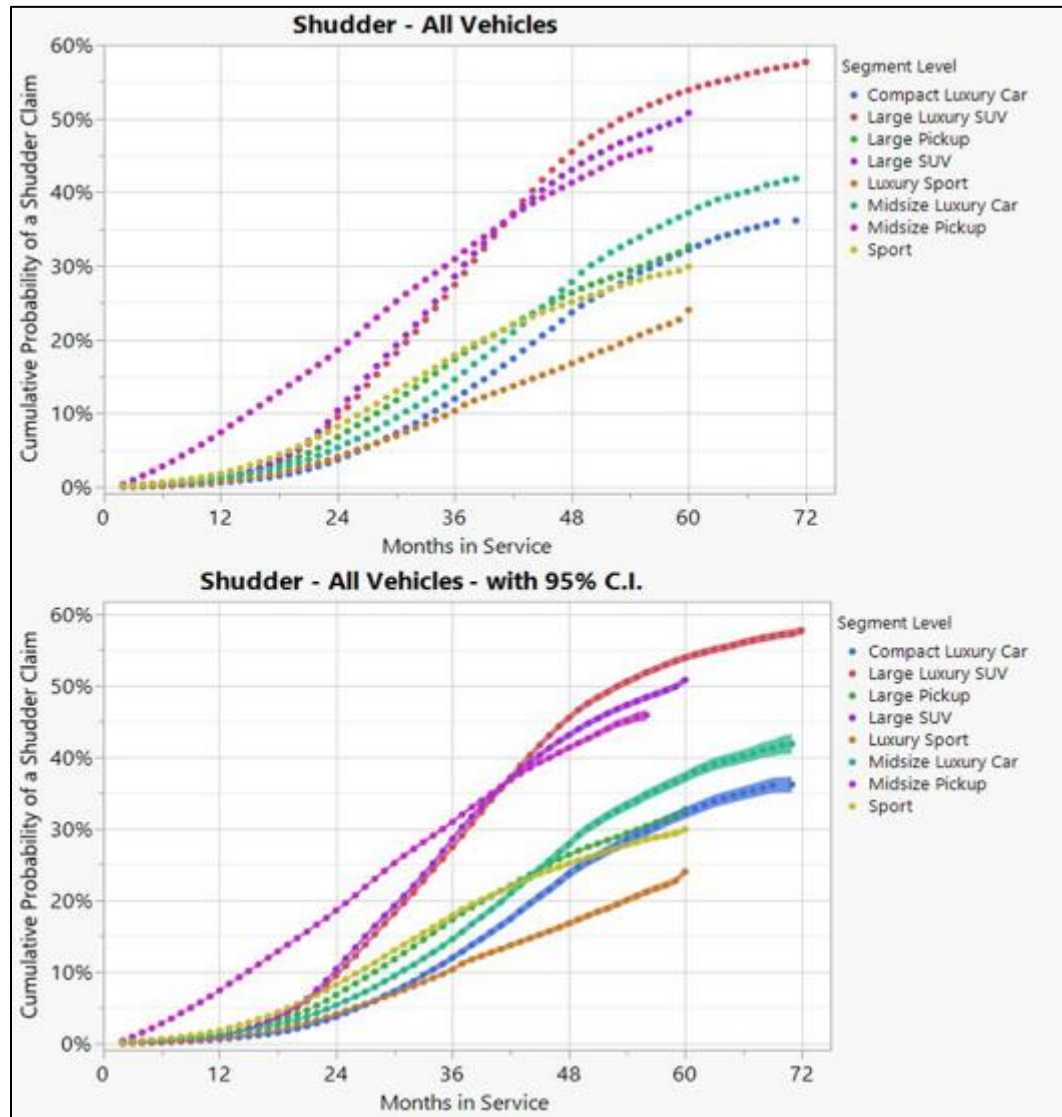


Figure 28. Cumulative claims rates vs MIS for “Shudder” warranty repairs by Market Segment.

- e. The range of cumulative claim rates for shudder by market segment and MIS are:
 - i. At 12 MIS, the cumulative claim rate for shudder varies from 0.7% (Luxury Sport – Corvette) to 7.4% (Midsize pickup – Colorado & Canyon), a ratio of about 10.
 - ii. At 24 MIS, the cumulative claim rate for shudder varies from 4.1% (Luxury Sport – Corvette) to 18.6%

- (Midsize pickup – Colorado & Canyon), a ratio of about 4.5.
- iii. At 36 MIS, the cumulative claim rate for shudder varies from 10.3% (Luxury Sport – Corvette) to 30.9% (Midsize pickup – Colorado & Canyon), a ratio of about 3.
 - iv. At 48 MIS, the cumulative claim rate for shudder varies from 16.7% (Luxury Sport – Corvette) to 41.3% (Midsize pickup – Colorado & Canyon), a ratio of about 2.5.
 - v. At 60 MIS, the cumulative claim rate for shudder varies from 24% (Luxury Sport – Corvette) to 53.9% (Large luxury SUV – Escalade), a ratio of about 2.2.
 - vi. The population does not present a common or homogeneous performance pattern for claims of shudder across market segments of the putative class.
- f. We can further investigate the conditions of shudder performance within the putative class by comparing the distribution of cumulative claims for shudder by MIS and market segment in consideration of the confidence intervals that register for each segment and time-in-service interval.
- For the putative class:
- i. At 12 MIS the CI range varied from 0.1% - 0.3% (2015 Corvette) to 9.1% – 9.7% (2019 Colorado).
 - ii. At 24 MIS the CI range varied from 2.3% – 3.0% (2016 ATS) to 24.6% – 26.6% (2017 Canyon).
 - iii. At 36 MIS the CI range varied from 6.4% – 7.9% (2019 Corvette) to 42.5% – 44.8% (2017 Canyon).
 - iv. At 48 MIS the CI range varied from 9.8% – 12.7% (2018 Corvette) to 54.6% – 57.0% (2017 Canyon).

- v. At 60 MIS the CI range varied from 17.2 – 18.7% (2017 Corvette) to 59.7% – 61.5% (2015 Yukon).
- g. In each analytical dimension, the detailed data is shown in Appendix 7 for shudder.
- h. Appendix 7 also reports analyses related to shudder claims by Transmission and MIS.
- i. Figure 29 below is a chart that graphs the cumulative percentage of the study population (i.e. the probability) for shudder related claims by MIS and by transmission type for putative class vehicles.³²⁹

³²⁹ See table 43 in Appendix 7 for tabular data.

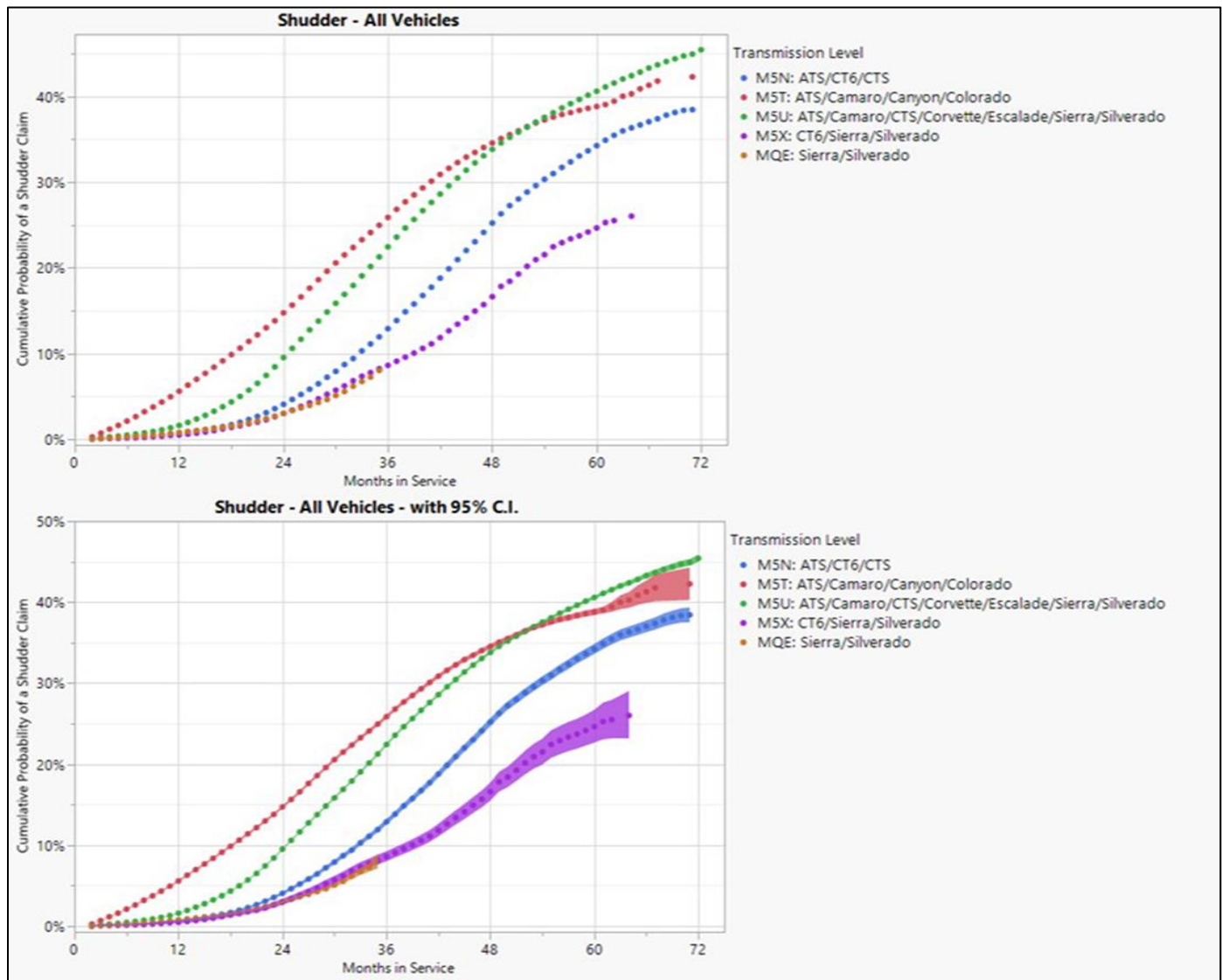


Figure 29. Cumulative claims rates vs MIS for “Shudder” warranty repairs by Transmission.

- j. The cumulative claim rates at 60 MIS by Transmission shudder are reported as follows:
 - i. 34.2% for the M5N Transmission (ATS, CT6 & CTS) with 95% CI 33.6% - 34.9%.
 - ii. 38.8% for the M5T Transmission (ATS, Camaro, Canyon & Colorado) with 95% CI 38.4% - 39.2%.

- iii. 40.6% for the M5U Transmission (ATS, Camaro CTS, Corvette, Escalade, Sierra & Silverado) with 95% CI 40.4% - 40.8%.
 - iv. 24.6% for the M5X Transmission (CT6, Sierra & Silverado) with 95% CI 22.7% - 26.7%.
 - v. At 24 MIS, 3.0% for the MQE Transmission (Cadillac ATS, Cadillac CT6, Cadillac CTS) with 95% CI 2.9% - 3.1%, these vehicles have not reached 60 MIS as yet.
 - k. The population does not present a common or homogeneous performance pattern for claims of shudder across models and model years of the putative class.
145. After investigation and consideration of multiple potential causes of shudder, GM concluded that water intrusion through the atmospheric vent into the transmission and absorption of that water into the ATF, was the cause of shudder. GM identified a specific environmental condition (exposure to high humidity) related to this cause.
- a. We can test the validity of GM's observation through analysis of its shudder related warranty data. Appendix 7 includes analyses related to humidity as cause of water intrusion and resultant shudder claims³³⁰ in the putative class. GM identified nine U.S. states as "high humidity" states: North Carolina, Texas, Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina and Tennessee.³³¹
 - b. Exponent classified these nine states as "high humidity states" and lumped the remaining 41 states into a "other

³³⁰ 2019-06-17 TCC Shudder SFADA_GM000176538_.pdf at slides 1, 6, & 13.

³³¹ Ibid at slide 1.

states” category for analysis of the similarity among the populations by market segment, model, model year and by MIS.

- c. Appendix 7 contains 62 unique analyses in a common format. Figure 30 is illustrative of data for the analyses. In general, after about 12 MIS, the segment or model population in the “humid” states are clearly distinguishable from the population in the “other” states. At 48 MIS the ratio may be 3 or 4 between the “humid” and “Other” populations, the “humid” population always the larger.
- d. The plots and tables for this analysis are shown in³³² Appendix 7. A typical plot for “Shudder Cumulative Claim Rates in Humid and Other states, Large Pickup Truck (Silverado and Sierra)” is shown in Figure 30.

³³² See table 58 in Appendix 7 for the supporting tabular data.

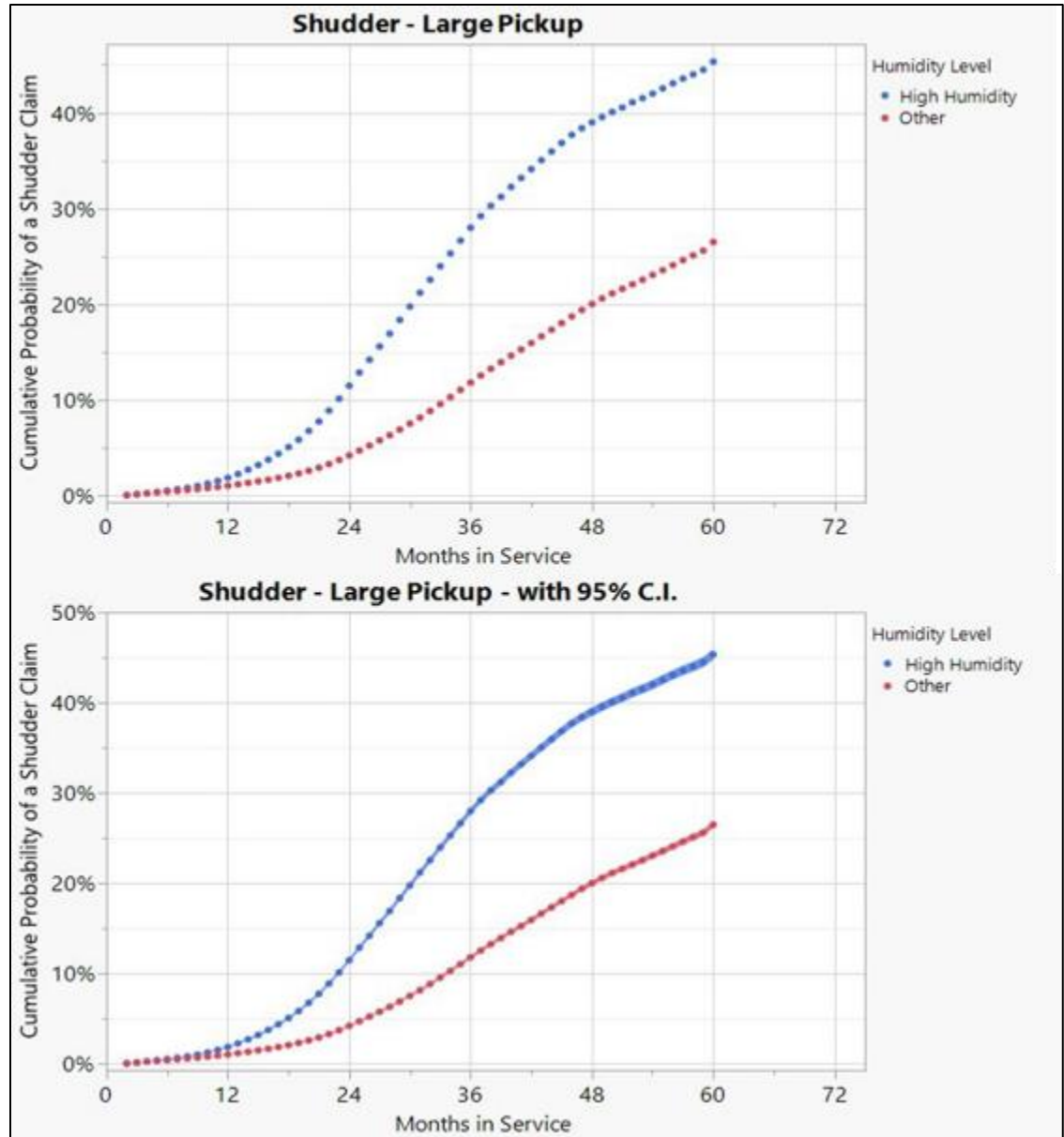


Figure 30. Shudder Cumulative Claim Rates in Humid and Other states, Large Pickup Truck (Silverado and Sierra).

- e. GM's hypothesis that water intrusion by environmental humidity is verified. The cumulative claims rate for shudder is greater in humid states than for the equivalent populations in other states at equivalent service periods. Although the comparative populations are equivalent in terms of design and susceptibility to water contamination, it is the

environmental conditions of the humid environments that cause the differential claims rates. The “high humidity” states and “other” states populations are not homogenous for cumulative shudder claims rates over time.

- f. Some examples of these patterns are:
 - i. For the Large Pickup truck market segment, at 60 MIS, the cumulative claim rate for shudder in “high humidity” states is 45.3% (95% CI 44.7% - 45.9%) and in “other” states is about 26.5% (95% CI 26.1% - 26.9%); a ratio of 1.7. The CI’s do not overlap.
 - ii. For the Large SUV market segment, at 60 MIS, the cumulative claim rate for shudder in high humidity states is 73.8% (95% CI 73.0% - 74.5%) and in other states it is about 37.7% (95% CI 37.1% - 38.3%); a ratio of around 2. The CI’s do not overlap
 - iii. For the Luxury Sport market segment (Corvette), at 60 MIS, the cumulative claim rate for shudder in high humidity states is 42.8% (95% CI 41.7% - 43.8%) and in other states it is about 14.0% (95% CI 13.4% - 14.5%); a ratio of 3. The CI’s do not overlap.
 - iv. For Large Luxury SUV market segment (Escalade), at 60 MIS, the cumulative claim rate for shudder in high humidity states is 82.7% (95% CI 79.4% - 80.8%) and in other states it is about 37.5% (95% CI 36.9% - 38.2%); a ratio of around 2. The CI’s do not overlap.
- g. This data shows the putative class is unlike and is dependent upon local environmental conditions and the putative class is not homogenous across the geographic boundaries Plaintiffs propose for the nationwide class.

- h. Figure 31 is a graph by U.S. State or Territory for VINS with a shudder related claim. The states and U.S. Territories with higher humidity levels record a higher fleet proportion that have registered shudder related claims than do the “other” (low-humidity) states.

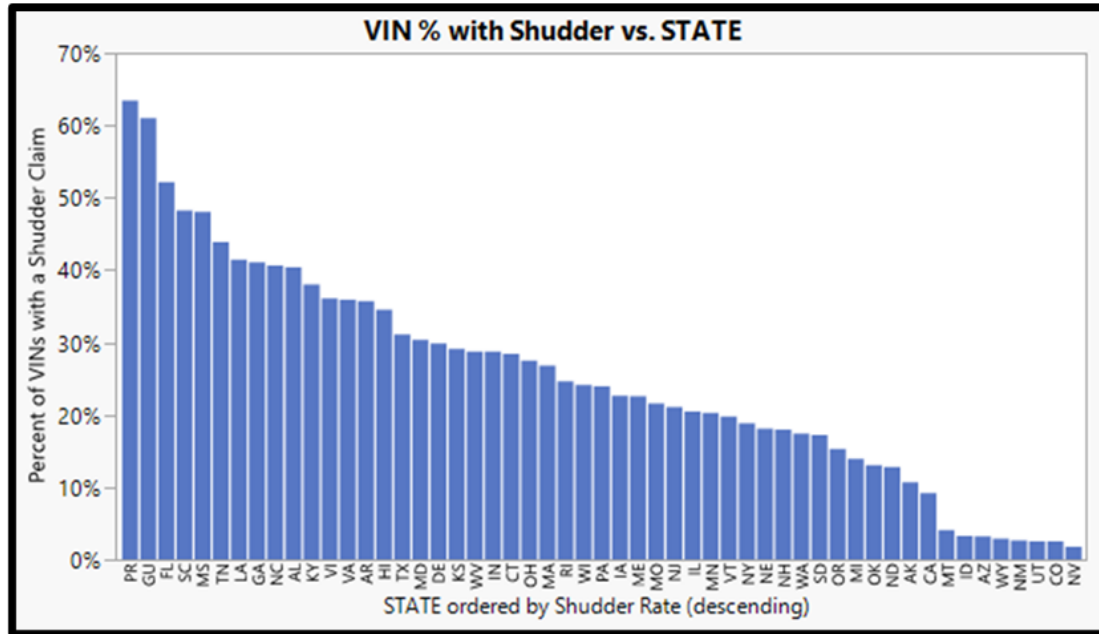


Figure 31. Distribution of Percent of the resident Population With “Shudder” related Warranty Claim.

- i. The eight states with the lowest percent of vehicles with a shudder claim are:
- i. Nevada (NV), the percent of VINs with a shudder claim is 1.8%.
 - ii. Colorado (CO), the percent of VINs with a shudder claim is 2.5%.
 - iii. Utah (UT), the percent of VINs with a shudder claim is 2.5%.
 - iv. New Mexico (NM), the percent of VINs with a shudder claim is 2.6%.

- v. Wyoming (WY), the percent of VINs with a shudder claim is 2.9%.
- vi. For Arizona (AZ), the percent of VINs with a shudder claim is 3.2%.
- vii. Idaho (ID), the percent of VINs with a shudder claim is 3.3%.
- viii. Montana (MT), the percent of VINs with a shudder claim is 4.1%.
- j. Objective quantitative analyses of the performance of putative class vehicles for claims of shudder are not homogenous by market segment, by vehicle model, by vehicle model year, or by state in which the vehicle is in service. Every available investigative metric for shudder performance registers diversity among the categories of vehicles examined in the analysis.
- k. When fully and fairly analyzed this data plainly illustrates a complex diversity of performance metrics; nether Plaintiffs' nor their experts will be able to manipulate these data into fact-based analyses for presentation to the Court that evince conditions of common performance across the putative class.

146. A new ATF, "Mod1a" was introduced into transmission production in February of 2019 to reduce the effects of moisture contamination as cause of shudder claims. Exponent examined the effectiveness of the ATF change by considering all complaints for shudder, not just the first claim and comparing the frequency of return(s) for shudder complaints prior to, and subsequent to the ATF change.

- a. The ATF change was affected at the transmission manufacturing plants about December of 2018.³³³ For purposes of warranty analysis, GM established the effective ATF change date in the vehicle assembly plants as March 1, 2019.³³⁴
- b. Figure 32 tracks repeat shudder related claims by the month in which the initial claim was registered. The ordinate (vertical axis) reports the percent of VINs that were repaired in the month (on the horizontal axis) that returned for a subsequent visit and registered an additional shudder claim. A value of 100% means every vehicle that registered a shudder claim in that month returned for at least one additional shudder claim subsequently.

³³³ Mr. Bill Goodrich deposition transcript, May 4, 2021, at page 190.

³³⁴ “DEFENDANT’S RESPONSE TO PLAINTIFFS’ FIFTH SET OF INTERROGATORIES, RICHARD FRANCIS, et al., v. GENERAL MOTORS, LLC, RESPONSE TO INTERROGATORY NO. 20: For vehicles manufactured with transmissions containing Mod1A, GM implemented Mod1A as a running change. The breakpoint for use of Mod1A in transmissions manufactured at GM’s Toledo Transmission Plant is December 10, 2018; the breakpoint for use of Mod1A in transmissions manufactured at GM’s Silao Transmission Plant is January 30, 2019. For purposes of warranty analysis of vehicles manufactured with transmissions containing Mod1A, GM uses a breakpoint of March 1, 2019.”

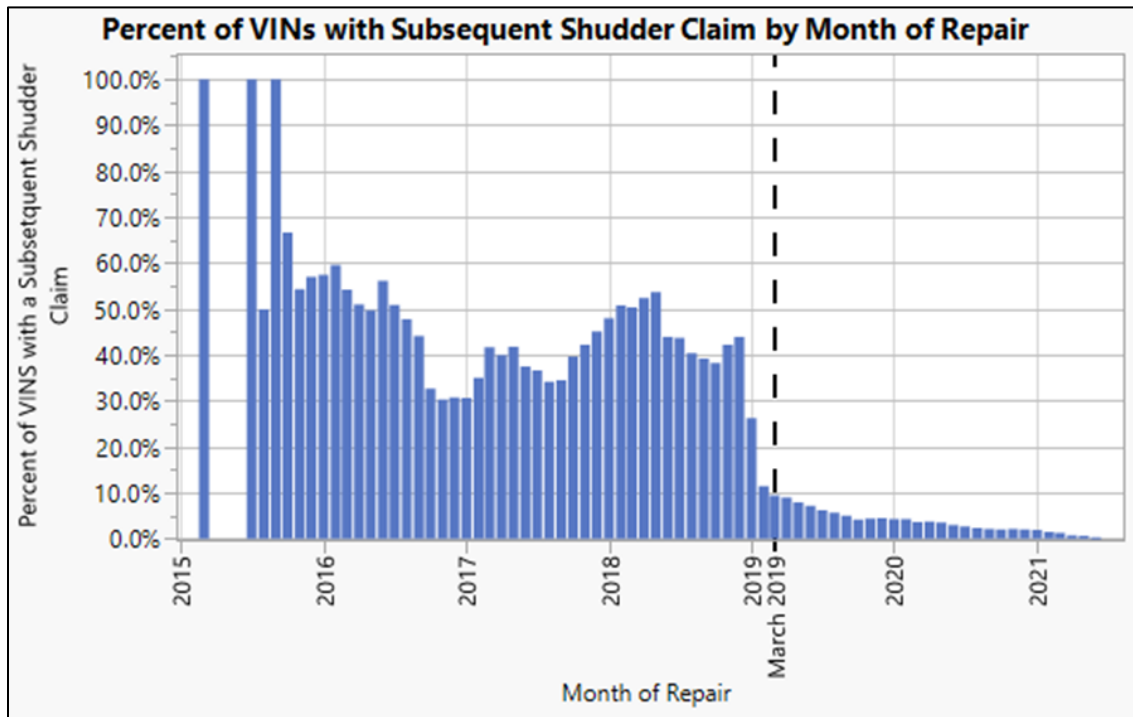


Figure 32. Percent of Vehicles (by VIN) with Subsequent Shudder Claim by Month of Repair.

- c. The effect of the ATF change is clearly manifest in a roughly 79% reduction³³⁵ in repeat shudder claims after the new ATF was implemented in March of 2019 as compared to the months immediately prior to the ATF change.

147. The effect is robust across vehicle model years (MY) as shown in Figure 33. All MY evidence the repeat claims reduction with implementation of the “Mod1a” ATF as of March 2019.

³³⁵ Using December 2018 as the base. About 44.0% of VINs with a shudder claim in December 2018 had a subsequent claim and about 9.4% of VINs with a shudder claim in March 2019 had a subsequent claim.

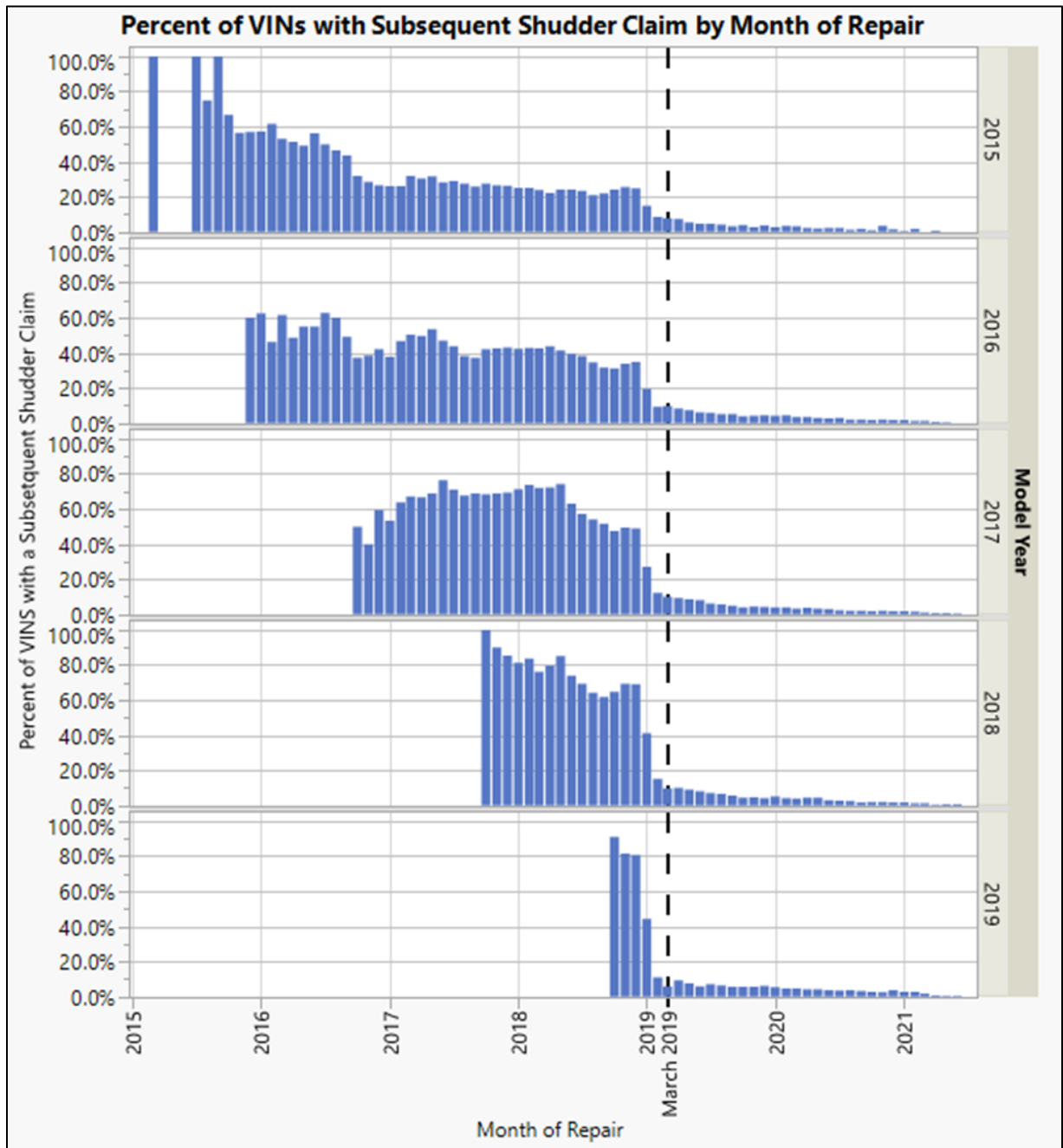


Figure 33. Percent of Vehicles (by VIN) with Subsequent Shudder Claim by Month of Repair and by Model Year.

148. After release of the new ATF, GM issued a Technical Service Bulletin (TSB) No. 18-NA-355 instructing dealers to service 8LXX transmissions with shudder complaints by flushing the

original equipment ATF with the new specified ATF³³⁶, the “Mod1a”. The TSB was issued in August 2019. Under the TSB, ATF drain-and-fill services are to be charged to labor code 8480818.³³⁷ Since the TSB release in August 2019 beginning September 1, 2019; 259,904 shudder claims on 252,059 unique VINs³³⁸ have been serviced with labor code 8480818 and would have received the new ATF.

149. In considering this data, an objective observer would conclude:

- a. 8LXX 8 speed automatic transmission claim rates for shudder complaints are not uniform across the vehicle types included in the putative class. At 60 MIS, the claim rate for shudder by segment is³³⁹:
 - i. 29.9% for the Sport segment (Camaro) with 95% CI 29.4% - 30.4%.
 - ii. 37.2% For the Midsize Luxury Car segment (CTS, CT6, CTS-V) with 95% CI 36.4% - 38.0%.
 - iii. At 48 MIS, 41.3% for Mid-size pickup trucks (Colorado and Canyon) with 95% CI 40.9% - 41.7%, the data do not extend to 60 MIS as yet.
 - iv. 50.8% for Large SUVs (Yukon, Yukon XL, Yukon Denali) with 95% CI 50.3% - 51.3%.
 - v. 32.7% for Large pickup trucks (Silverado, Sierra) with 95% CI 32.4% - 33.0%.

³³⁶ “GM TSB No.: 18-NA-355, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at Steady Speed” (GM000956387)

³³⁷ Ibid at page 17.

³³⁸ “Duffy_Dennis_911386_K_2018_2021.xlsx” (GM000861906) and “Duffy_Dennis_911386_K_2015_2017.xlsx” (GM000861907)”

³³⁹ See table 1 in Appendix 7 for tabular data.

- vi. 32.2% for the Compact Luxury Car segment (ATS) with 95% CI 31.4% - 33.0%.
- vii. 53.9% for the Large Luxury SUV segment (Escalade) with 95% CI 53.3% - 54.4%.
- viii. 24.0% for the Luxury Sport segment (Corvette) with 95% CI 23.5% - 24.5%.
- b. Variations occur due to vehicle integration differences among the vehicle architectures (mid-size truck, full size pickup truck, mid-size sedans, sport cars).
- c. Variations occur due to geographic location and shudder complaints are more prevalent in geographical areas of high humidity.
- d. Persistence of the shudder condition prior to implementation of the “Mod1a” ATF as a repair for shudder varies widely over time with repeat repair rates from about 2 repeat repairs per original repair for vehicles manufactured in 2017 to about 0.25 repeat repairs per original repair for vehicles manufactured in 2015. Continuation of the complaint condition after the first repair is not uniform across the putative class fleet.
- e. Application of the “Mod1a” ATF in December 2018³⁴⁰ has proven effective in addressing most 8LXX transmission shudder complaints.
- f. GM TSB 18-NA-355 is available to address 8LXX shudder complaints that may occur in the future.

³⁴⁰ At transmission plants

150. With these facts in mind, it is clear that evidence of complaint conditions and defect conditions related to transmission shudder are not common across the putative class.

Safety Assessment

151. GM initiated at least [REDACTED] safety defect investigations regarding the 8L transmissions' performance issues as summarized in Exhibit 578 to Mr. David Hartfelder's deposition included the first page of the materials for each presentation to the "OIR". Each investigation is uniquely identified. These documents are investigations summaries and register: some elements regarding the history of each investigation (discovery, condition, effects), root cause, field data, and recommendations for resolution.

- a. GVS-CORE ID: N17-212697³⁴¹ registers:
 - i. File Last Revised 2018-03-02³⁴²
 - ii. Scope of the investigation: "2016-2017 Chevrolet Silverado & GMC Sierra w / L83 (5.3L Engine) and MSU (8-speed auto Transmission)"³⁴³
 - iii. [REDACTED].
 - iv. The condition is recorded as a severity of [REDACTED]³⁴⁴ – not a safety issue.
 - v. "[REDACTED]
[REDACTED]"³⁴⁵

³⁴¹ Exhibit 578 to Mr. David Hartfelder's deposition, slide 1.

³⁴² Ibid.

³⁴³ Exhibit 578 to Mr. David Hartfelder's deposition, slide 1 and N17-212697 Transmission Lunge OIR (GM000570775).pdf

³⁴⁴ Ibid. Severity ratings on the "OIR" report of 2 indicates the issue is related to customer satisfaction but not to safety. Mr. David Hartfelder's deposition transcript at pages 84 – 85.

³⁴⁵ Ibid.

vi. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]”³⁴⁶

(Emphasis added).

vii. Multiple transmission hardware and software conditions are listed as root causes: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]³⁴⁷

viii. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].

ix. GM determined to not recall the vehicles, there was no discernable safety defect that presented an unreasonable risk to motor vehicle safety.

x. This is the same “OIR” report discussed at ¶¶ 107 and 110 supra.

b. GVS-CORE ID: N18-215285³⁴⁸

i. File Last Revised 2018-05-07³⁴⁹

³⁴⁶ Ibid.

³⁴⁷ Ibid.

³⁴⁸ Exhibit 578 to Mr. David Hartfelder’s deposition, slide 2, and N18-215285 TCC Shudder OIR (GM000561785).pdf.

³⁴⁹ Ibid.

- ii. Scope of the investigation: “2017 - 2018 Chevrolet Colorado, GMC Canyon (RPO: M5T)”³⁵⁰
- iii. [REDACTED].
- iv. The condition is recorded as a severity of [REDACTED]³⁵¹ – not a safety issue.
- v. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”³⁵²
- vi. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”³⁵³
- vii. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”³⁵⁴
- viii. [REDACTED].

³⁵⁰ Ibid.

³⁵¹ Ibid. Severity ratings on the “OIR” report of 2 indicates the issue is related to customer satisfaction but not to safety. Mr. David Hartfelder’s deposition transcript at pages 84 – 85.

³⁵² Ibid.

³⁵³ Ibid.

³⁵⁴ Ibid.

- ix. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].
- x. GM determined to not recall the vehicles, there was no discernable safety defect that presented an unreasonable risk to motor vehicle safety.
- xi. In the original “OIR” report additional information is included:
1. “[REDACTED]
[REDACTED]
[REDACTED]”³⁵⁵ GM had initiated service actions to address the problem as customers presented vehicles for repair.
2. [REDACTED]
[REDACTED].³⁵⁶
- c. GVS-CORE ID: N19-221407³⁵⁷
- i. “File Last Revised 2019-04-25”³⁵⁸
- ii. Scope of the investigation: “Model Years Models 2015-20 MY:: Camaro & A1XXLTG: GMT61O LWN: 31XXLGZ :Y lxx LT1”³⁵⁹ The issue was confined to Camaro only, not common to the putative class.
- iii. [REDACTED]³⁶⁰.

³⁵⁵ N18-215285 TCC Shudder OIR (GM000561785).pdf at slide 2.

³⁵⁶ Ibid at slide 14.

³⁵⁷ Exhibit 578 to Mr. David Hartfelder’s deposition, slide 3, and N19-221407 2015 - 2019 Multi Veh 8SpdTransMod1AOil ColdPerfStall OIR Decision CWNFA 29APR2019 (GM000991995).pdf

³⁵⁸ Ibid.

³⁵⁹ Ibid.

³⁶⁰ Ibid.

iv. Severity is reported as ■.³⁶¹

V. “ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”

vi. “ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] ” 362

vii. “ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED],”³⁶³

viii. [REDACTED] 364

“ [REDACTED]

[REDACTED]

[REDACTED] ” 365

ix. [REDACTED]
[REDACTED]
[REDACTED].

X. [REDACTED]
[REDACTED]. An engine stall on a vehicle that is not in traffic does not present risk of

361 Ibid.

362 Ibid.

363 Ibid.

364 Ibid.

³⁶⁵ N19-221407 2015 - 2019 Multi Veh 8SpdTransMod1AOil ColdPerfStall OIR Decision CWNFA 29APR2019 (GM000991995).pdf, slide 2 and Mr. David Hartfelder's deposition transcript at pages 84 – 85.

collision. [REDACTED]
[REDACTED].³⁶⁶

- xi. GM determined to not recall the vehicles, there was no discernable safety defect that presented an unreasonable risk to motor vehicle safety.

d. GVS-CORE ID: N19-221782³⁶⁷

- i. This “OIR” was discussed at ¶ 120 supra.
- ii. “File Last Revised 2019-06-17”
- iii. Scope of the investigation: “2015-2019MY Camaro, Corvette, CTS, Escalade, Yukon, CT6, ATS, FST, MST, GVAN (M5N, MSU, MST, MSX, MQE)”
- iv. [REDACTED].
- v. The condition is recorded as a severity of [REDACTED] – not a safety issue.³⁶⁸
- vi. “Condition: Torque converter shudder.”³⁶⁹
- vii. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”³⁷⁰
- viii. “[REDACTED]
[REDACTED]

³⁶⁶ N19-221407 2015 - 2019 Multi Veh 8SpdTransMod1AOil ColdPerfStall OIR Decision CWNFA 29APR2019 (GM000991995).pdf, slide 4.

³⁶⁷ Exhibit 578 to Mr. David Hartfelder’s deposition, slide 4, and N19-221782 TCC Shudder SFADA_GM000176538_.pdf

³⁶⁸ Ibid. Severity ratings on the “OIR” report of 2 indicates the issue is related to customer satisfaction but not to safety. Mr. David Hartfelder’s deposition transcript at pages 84 – 85.

³⁶⁹ Exhibit 578 to Mr. David Hartfelder’s deposition, slide 4, and N19-221782 TCC Shudder SFADA_GM000176538_.pdf.

³⁷⁰ Ibid.

- t [REDACTED]
[REDACTED]
[REDACTED].”³⁷¹
- ix. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”³⁷²
- x. A high frequency vibration detectable and objectionable to some occupants does not pose an unreasonable risk to motor vehicle safety although it can motivate some consumers to complain or even report some alarm at an unexpected and irregular event.
- xi. GM determined to not recall the vehicles, there was no discernable safety defect that presented an unreasonable risk to motor vehicle safety.
- e. GVS-CORE ID: N19-228256³⁷³
- i. Scope of investigation – “2019MY Silverado & Sierra LD (T1XX) w/L84&MQE (8L90 8 speed transmission)”³⁷⁴
- ii. “[REDACTED]”³⁷⁵
- iii. Initiated due to “[REDACTED]
[REDACTED]”.³⁷⁶

³⁷¹ Ibid.

³⁷² Ibid.

³⁷³ Exhibit 578 to Mr. David Hartfelder’s deposition, slide 5 and N19-228256 2014-2019 K2XX Surge-lurch complaints SFADA 2020-2-20 (GM000992101).pdf.

³⁷⁴ Ibid.

³⁷⁵ Ibid.

³⁷⁶ Ibid.

This action was in response to an NHTSA inquiry and is confined to lunge forward and harsh shifting.

- iv. The condition is recorded as a severity of ■ – not a safety issue.³⁷⁷

- V. “ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].”³⁷⁸

- [illegible]

- vii. “ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]. ”380

³⁷⁷ Ibid. Severity ratings on the “OIR” report of 2 indicates the issue is related to customer satisfaction but not to safety. Mr. David Hartfelder’s deposition transcript at pages 84 – 85.

³⁷⁸ Exhibit 578 to Mr. David Hartfelder's deposition, slide 5.

379 Ibid.

380 Ibid.

viii. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].³⁸¹

ix. A change in deceleration rate does not pose an unreasonable risk to motor vehicle safety although it can motivate some consumers to complain or even report some alarm at an unexpected and irregular event.

x. GM determined to not recall the vehicles, there was no discernable safety defect that presented an unreasonable risk to motor vehicle safety.

f. GVS-CORE ID: N19-228272³⁸²

i. [REDACTED]³⁸³

ii. Scope of investigation: “2019 MY Silverado & Sierra LD (T1XX) w/L84&MQE (8L90 8 speed transmission)”³⁸⁴

iii. Initiated due to “... [REDACTED]
[REDACTED]”.³⁸⁵

iv. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]”³⁸⁶

³⁸¹ N19-228256 2014-2019 K2XX Surge-lurch complaints SFADA 2020-2-20 (GM000992101).pdf, slide 2.

³⁸² Exhibit 578 to Mr. David Hartfelder’s deposition, slide 6 and N19-228272 2019MY Silverado Sierra LD - Alleged Lunge-Lurch upon Shifting (8L90 Transmission) Rev1 SFADA 2020-01-16.

³⁸³ Ibid.

³⁸⁴ Ibid.

³⁸⁵ Ibid.

³⁸⁶ Ibid.

v. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]”³⁸⁷

vi. “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]”³⁸⁸

vii. “[REDACTED]
[REDACTED]
[REDACTED]”³⁸⁹

- viii. A change in deceleration rate does not pose an unreasonable risk to motor vehicle safety although it can motivate some consumers to complain or even report some alarm at an unexpected and irregular event.
- ix. GM determined to not recall the vehicles, there was no discernable safety defect that presented an unreasonable risk to motor vehicle safety.

³⁸⁷ Ibid

³⁸⁸ Ibid.

³⁸⁹ Ibid.

g. GVS-CORE ID: N21-233644³⁹⁰

- i. “[REDACTED]”³⁹¹
- ii. Scope of investigation – “2019-2021MY Silverado & Sierra LB (T1XX) w/L84&MQE (8L90 8 speed transmission)”³⁹²

[illegible]

██████████³⁹³ This “OIR” is an update to GVS-CORE ID: N19-228272 discussed at ¶ 151.f supra. ██████████

iv. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

1. [REDACTED]
[REDACTED] 394

³⁹⁰ Exhibit 578 to Mr. David Hartfelder's deposition, slide 7 and N21-233644 2019-21TIXX LDPU Alleged Lunge-Lurch-Hesitation Upon Shifting-8L90 Transmission rev 2 SFADA 2021-7-1 (GM000992152).pdf.

391 Ibid.

392 Ibid.

393 Ibid.

³⁹⁴ N21-233644 2019-21TIXX LDPU Alleged Lunge-Lurch-Hesitation Upon Shifting-8L90 Transmission rev 2
SFADA 2021-7-1 (GM000992152).pdf at slide 32, “4 Pertinent Accident TREAD Verbatim as of 2021-5-10”.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED], it is unreasonable to conclude such an event could result in a collision.

2. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].³⁹⁷ This appears more likely to be a problem with driver throttle control than transmission shift performance.

3. [REDACTED]
[REDACTED].³⁹⁸ Traffic appurtenances such as poles commonly are not in the lane of traffic. To hit a pole from being stopped at a light, a car would have to traverse some distance from rest to the pole and also likely change direction. It is unreasonable to conclude such an event could result solely from a transmission harsh shift from a stop.

4. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].³⁹⁹ Cars are supposed to respond to driver control input. It is unreasonable to conclude such

³⁹⁵ 2020-01-10 Transmission Lunge_Lurch_Hesitation OIR (GM000571778).pdf at page 2. E

³⁹⁶ Ibid.

³⁹⁷ N21-233644 2019-21TIXX LDPU Alleged Lunge-Lurch-Hesitation Upon Shifting-8L90 Transmission rev 2 SFADA 2021-7-1 (GM000992152).pdf at slide 32, "4 Pertinent Accident TREAD Verbatim as of 2021-5-10".

³⁹⁸ Ibid.

³⁹⁹ Ibid.

an event could result solely from a transmission harsh shift from a stop.

- v. These four consumer reports each lack a description of an event that is consistent with a harsh transmission shift. All appear to be issues related to driver control, not transmission malfunction or failure.

Summary of Plaintiffs' Technical Analyses

152. Dr. M. McVea authored a report in the instant matter to “evaluate GM (General Motors, LLC) transmissions from MY2015 to MY2019 in vehicles that contain 8L product family of automatic transmissions to determine if the design and / or architecture had a common defect causing NVH (Noise Vibration Harshness) or handling issues including in lower gears, surging, lurching, jerking, lunging, rough coast downs, and at higher gears, shuddering or shaking at steady state speeds.”⁴⁰⁰ This scope is broader than the claims Plaintiffs make in their “Complaint” and is so broad as to be inclusive of nearly any “Noise Vibration and Harshness”⁴⁰¹ (NVH) issue. Harsh shifts and shudder may occur during gear changes, but “handling issues” and “shaking at steady state speeds” are unlikely to be linked to a transmission shuddering or shifting gear ratios in a harsh manner. However, under some conditions all vehicles may present vibrations of the nature proposed by Dr. McVea for his consideration here.

153. Dr. McVea wrote that the “8L series of automotive based automatic transmission developed and sold by GM has exhibited undesirable operational and functional characteristics at a failure

⁴⁰⁰ Dr. M. McVea report dated 10/8/2021, herein after “Dr. McVea’s Report”.

⁴⁰¹ Noise Vibration and Harshness” (NVH) is a term of art within automotive engineering describing a technical specialty focused upon modeling, testing, measurement, characterization, analyses, and mitigation of vibrations of any sort. Vibrations can be due to wind buffeting, cabin resonance, loose parts, engine function among many other possible causes.

rate consistent with a design flaw or other design related issue(s)”.⁴⁰²

154. Dr. McVea simply restated the GM findings regarding TCC shudder. He quotes GM in writing “GM graded the frequency of shudder among the MY15-MY19 8L vehicles as “Occ[urrence] #5.” In GM metrics that means a warranty level of >111 IPTV (Incidents Per Thousand Vehicles, or greater than 11% claims rate)”.⁴⁰³ At such an occurrence rate about 89% of customers may never experience TCC shudder.

155. Factors that can influence shudder during gear ratio changes include the ATF used, the amount of water in the ATF, the condition of the friction surfaces, the control logic and mechanisms used to actuate the clutches for the required gear ratio, as well as driver inputs.⁴⁰⁴

156. The proposed class has a diverse rate of shudder occurrences and not all vehicle models in the class experience the same rates of shudder events. Dr. McVea illustrates this, describing the different rates of warranty claims for different vehicle platforms and for owners in different regions, and showing that vehicles in higher humidity areas tended to have more occurrences of shudder as shown in Figure 34. Clearly, the claims rate varies as a function of location, with high humidity locales generating more frequent claims.

⁴⁰² Dr. McVea’s Report

⁴⁰³ Ibid

⁴⁰⁴ See ¶¶ 34 supra.

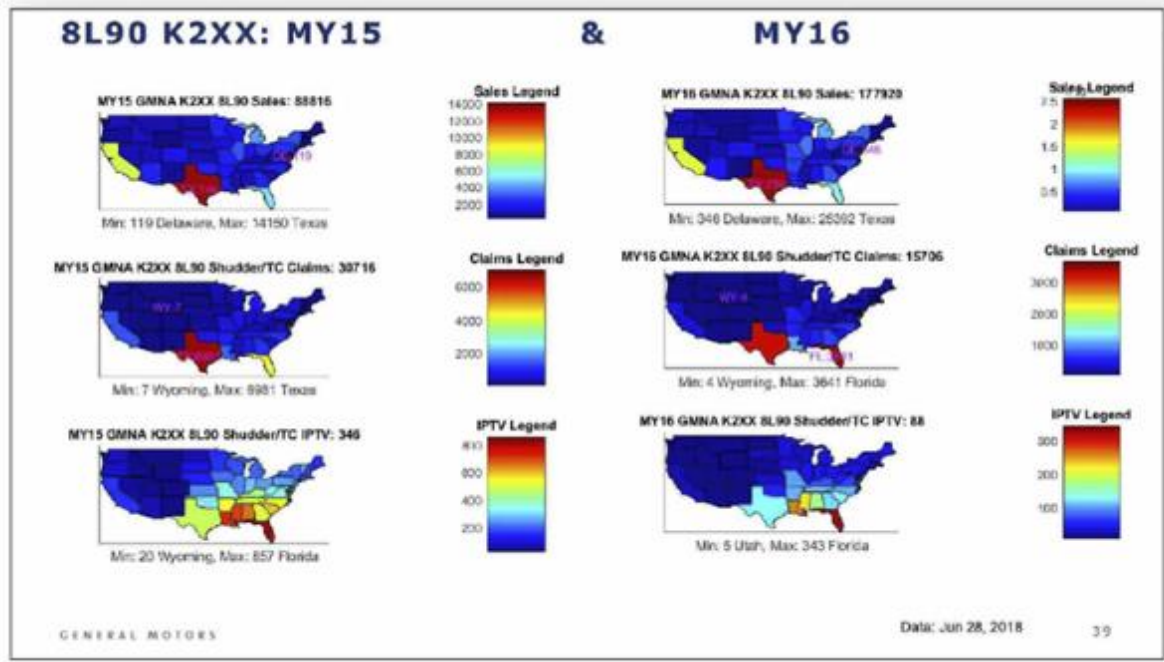


Figure 34. Figure from Dr. McVea Report. Shudder claims by state.⁴⁰⁵

157. As GM addressed the customers shudder concerns with a change in ATF, the shudder claims rate decreased greatly for midsize trucks. Dr. McVea noted that “in March of 2019, GM introduced a GTL ATF Mod1a into service. By all accounts, the shudder claims fell. It went down with respect to midsize trucks from 255 IPTV to 18.”⁴⁰⁶ He thus acknowledges there are a diverse range of experiences among the owners as regards the likelihood of developing TCC shudder.

158. Dr. McVea analyzed the ATF characteristics as described by GM documents, he stated “Shudder, typically emanating from the torque converter, but these comments are applicable to any frictional interface exposed to the Option B or 212b ATF, is the end result of the failure of the interaction of the ATF and friction

⁴⁰⁵ Dr. McVea’s Report at page 30. Original document: Exhibit 570, Bates document starting at GM000056268.

⁴⁰⁶ Dr. McVea’s Report at page 32.

material used in the clutch.” He also stated that “The 8L family of transmission systems, which began with 212B/WFP6300, was already degrading to a negative slope even before water or time degraded it. Option B had a better curve at its start, but over its life degraded”⁴⁰⁷ and pointed to Figure 35 as a reference. Dr. McVea claimed that the Option-B ATF would change its friction curve slope over life of the transmission, regardless of moisture ingestion. This is an incorrect interpretation of the data presented in the figure.

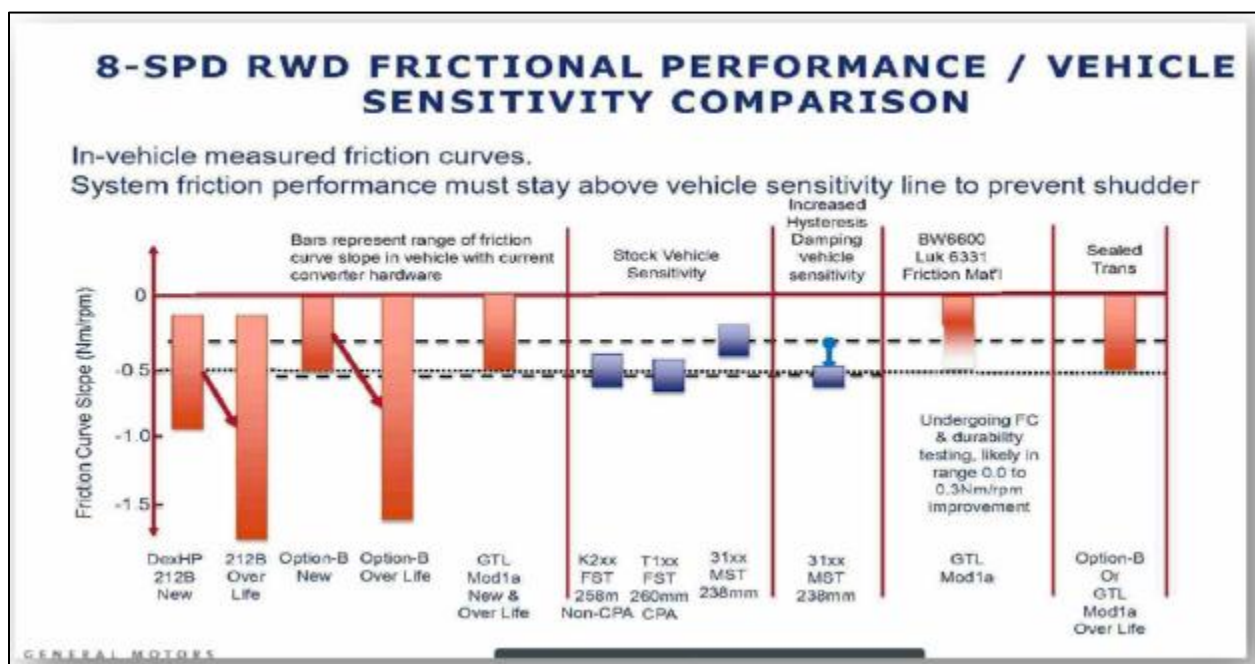


Figure 35. Figure from Dr. McVea's report, page 21.⁴⁰⁸

159. The change in the friction curve of Option-B ATF over its life as shown in Figure 35 is related to the moisture in the ATF and not solely to service exposure. Examination of the left-hand side of Figure 35 shows that when Option-B ATF is new (meaning no moisture), the friction curve slope is equivalent to the GTL Mod1a ATF when new. The bar on the far-right hand side of the figure shows that when either the Option-B ATF or the GTL

⁴⁰⁷ Dr. McVea's Report at page 20.

⁴⁰⁸ Dr. McVea's Report at page 21. Original document: Exhibit 570, Bates Document starting at GM000056268.

Mod1a ATF are used in a sealed transmission (meaning no moisture exposure), the friction curve slope over life is equivalent. This is summarized in the green boxed comments and arrows in Figure 36 below.

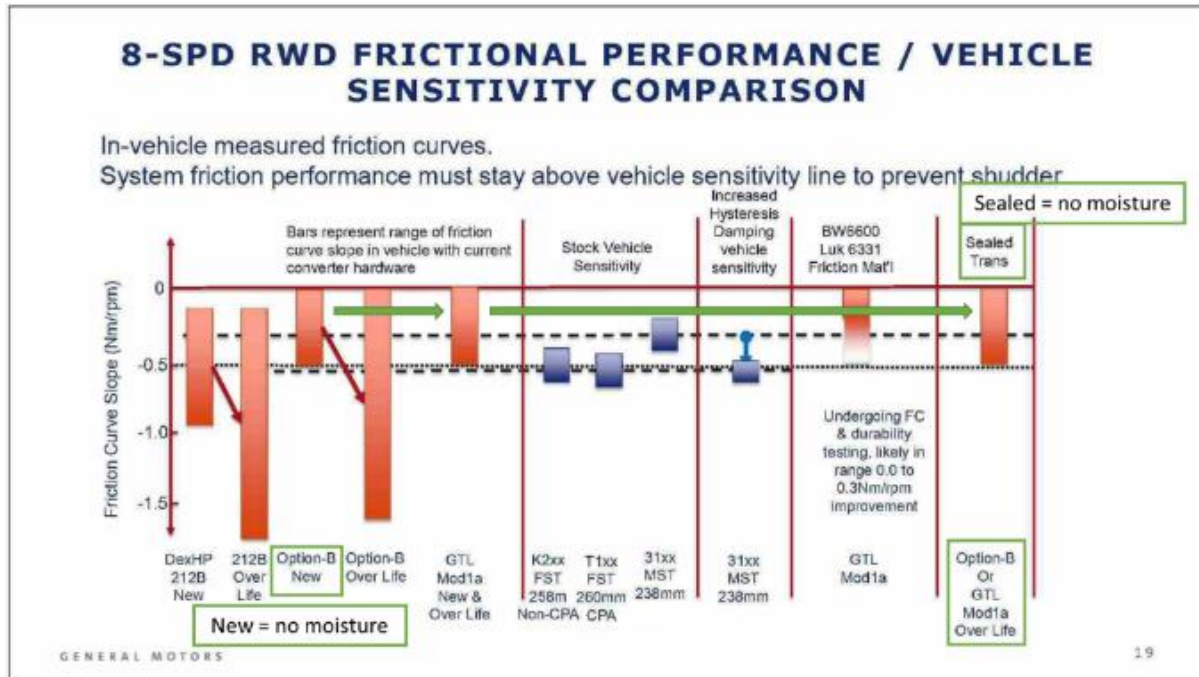


Figure 36. GM000056286 with comments and arrows added.⁴⁰⁹

160. GM is not the only vehicle manufacturer to have received and addressed transmission shudder complaints. In May 2018 Honda issued a service bulletin (Job Aid) to describe how one should diagnose torque converter clutch shudder in Honda vehicles using Honda's i-HDS tools.⁴¹⁰ This bulletin provided examples of transmission component speeds as a function of time to illustrate how shudder presents as rapid oscillations in the speed traces of the input and output shafts while the engine speed remains smooth "To determine if the vibration you're feeling in the vehicle is being caused by the torque converter, you need to

⁴⁰⁹ Figure from GM000056286. Green boxes around existing text, green arrows, and additional text in green boxes "New = no moisture" and "Sealed = no moisture" added by Exponent.

⁴¹⁰ Honda Job Aid. Torque Converter Clutch Shudder Snap Shot Evaluation Job Aid. May 2018 Version 2. Herein after "Honda TCC Shudder May 2018".

examine the relationship between Engine Speed and Transmission Input (Main) and Output (Counter) Shaft Speed.”⁴¹¹.

161. Figure 37 and Figure 38 below show engine, input shaft, and output shaft speed traces of a vehicle that does not exhibit TCC shudder during gear shifts. The speed traces are smooth (absent discontinuous changes) during the gear ratio changes. Honda wrote: “In a vehicle with a known good torque converter, Engine Speed, Input Shaft and Output Shaft speeds will all be smooth”.⁴¹²

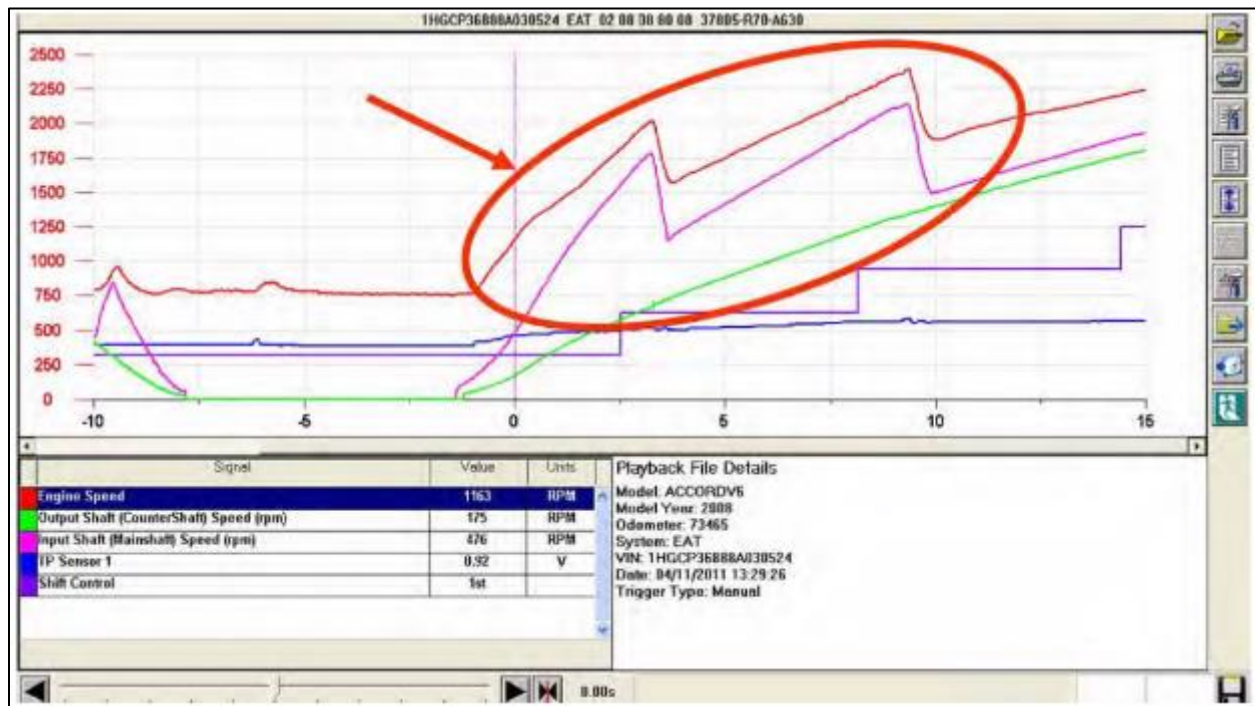


Figure 37. Example of smooth input and output shaft speeds, indicating no TCC shudder.⁴¹³

⁴¹¹ Ibid, at page 2.

⁴¹² Ibid, at page 2.

⁴¹³ Ibid.

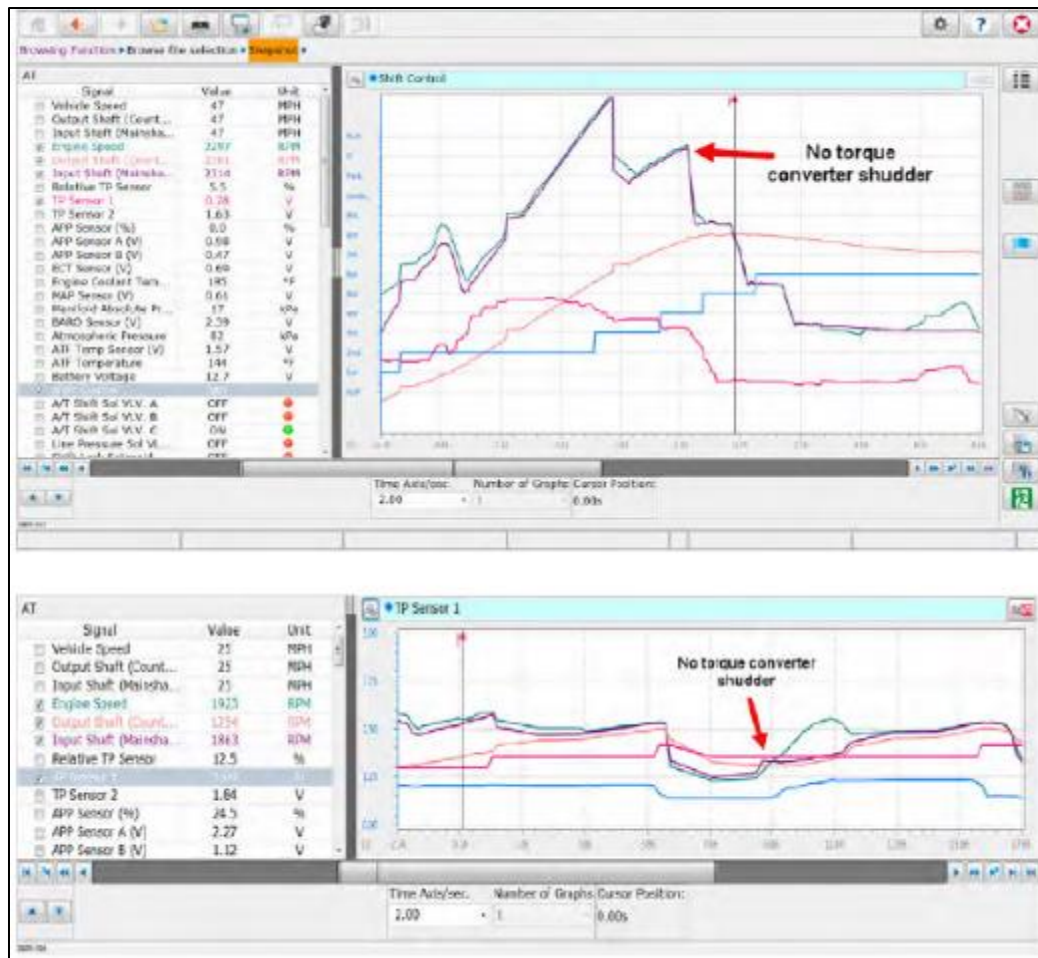


Figure 38. Examples of no TCC shudder.⁴¹⁴

162. Figure 39 shows a trace of a vehicle that exhibits TCC shudder during gear shifts, and the speed traces show oscillations (regions circled in red and identified with red arrows) during the gear ratio changes. Honda wrote: “If you are dealing with a vibration caused by a faulty torque converter, you will see oscillations in the Input and Output shaft when the engine speed is smooth as shown below:”⁴¹⁵

⁴¹⁴ Honda TCC Shudder May 2018.

⁴¹⁵ Ibid, at page 3.

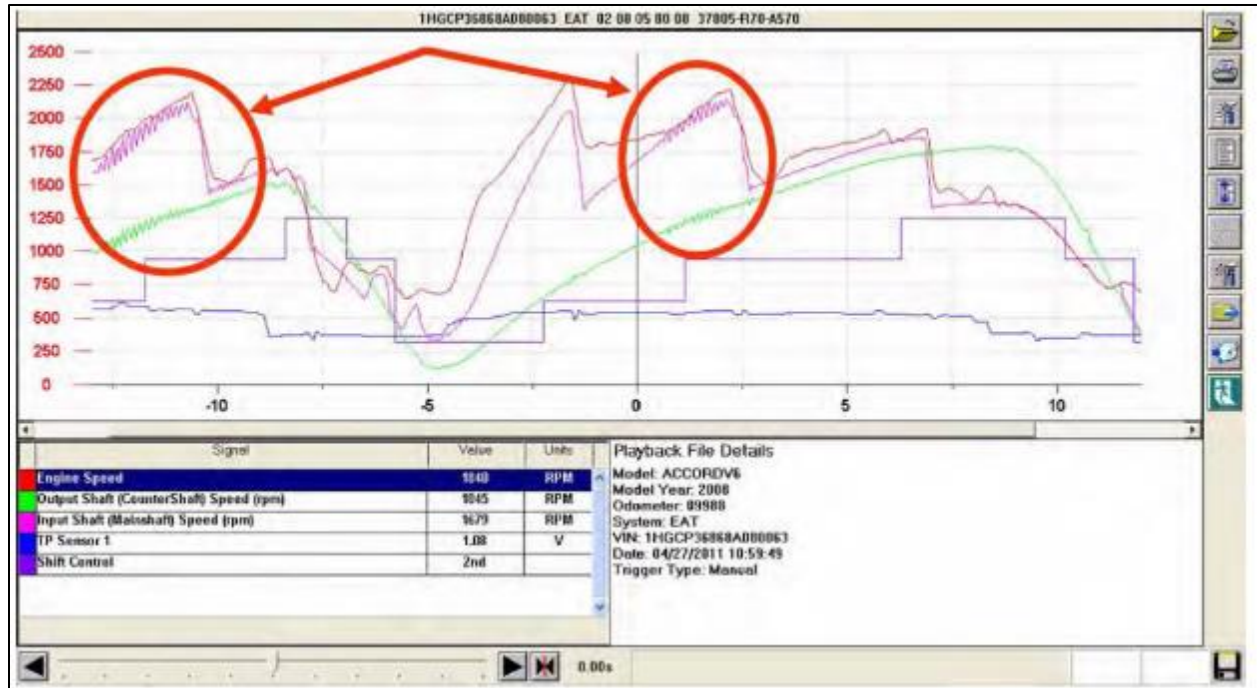


Figure 39. Example of oscillations visible in the input and output speeds, indicating TCC shudder.⁴¹⁶

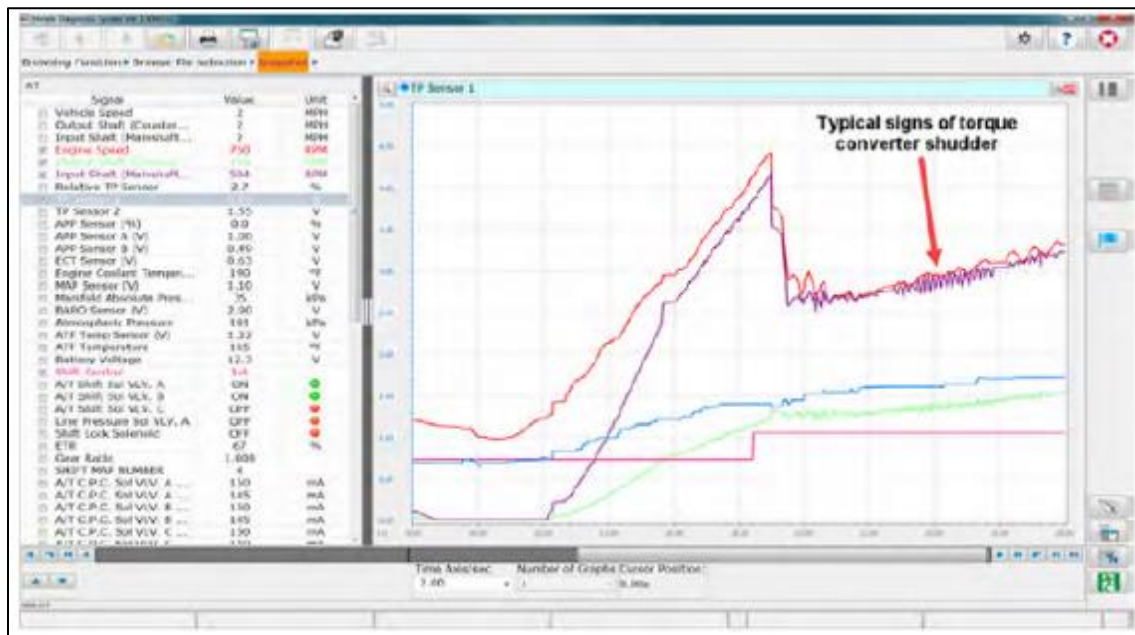


Figure 40. Example showing the typical oscillations associated with TCC shudder.⁴¹⁷

⁴¹⁶ Honda TCC Shudder May 2018.

⁴¹⁷ Ibid.

163. This example shows how the measured engine, input shaft, and output shaft speeds can be used to diagnose high frequency TCC shudder.

- a. Additional data from Honda's bulletin are shown below, the regions of oscillations in the shaft speeds document TCC shudder, see Figure 41. Again, in these examples the engine speed change remains smooth while the input and output shaft speeds oscillate.

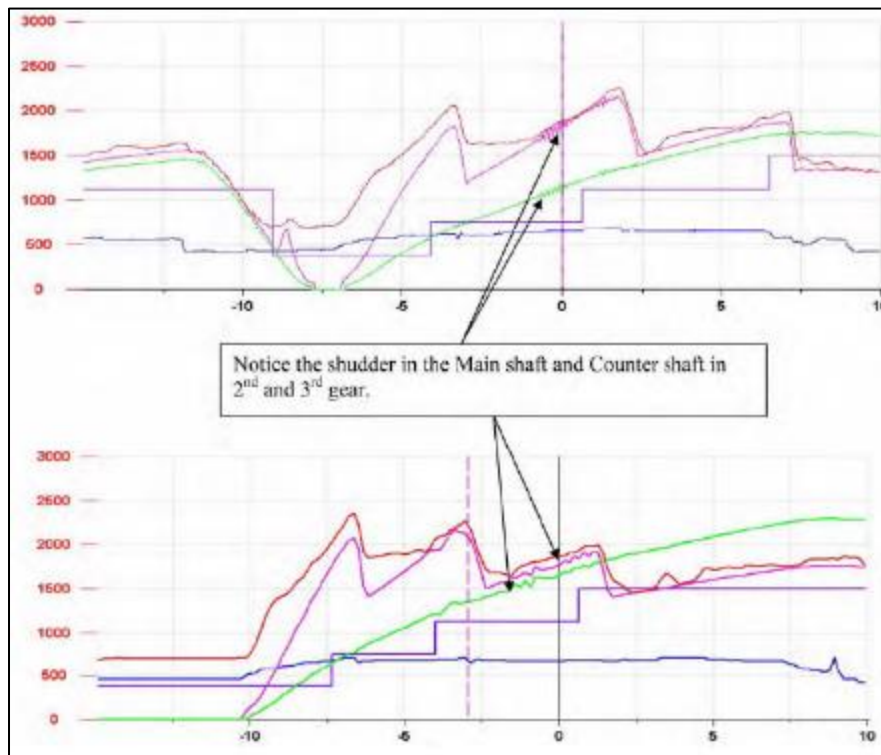


Figure 41. Examples of shaft speed traces oscillating due to shudder.⁴¹⁸

164. Dr. McVea provided figures (shown below in Figure 42) generated by a GM GDS2 inspection tool and claimed the traces show TCC shudder, and stated “The highlighted section (red box) indicates TCC shudder. This observed phenomenon is evident and similar to data I collected as shown below.”⁴¹⁹ The figure legend shows that the blue trace is “TCC Slip Speed”. Unlike

⁴¹⁸ Honda TCC Shudder May 2018.

⁴¹⁹ Dr. McVea's Report, at page 53.

Honda's bulletin presented above, no rapid oscillations can be seen in the "highlighted section (red box)"⁴²⁰ because of the time scale of the data as presented by Dr. McVea is inadequate for assessment of TCC shudder.

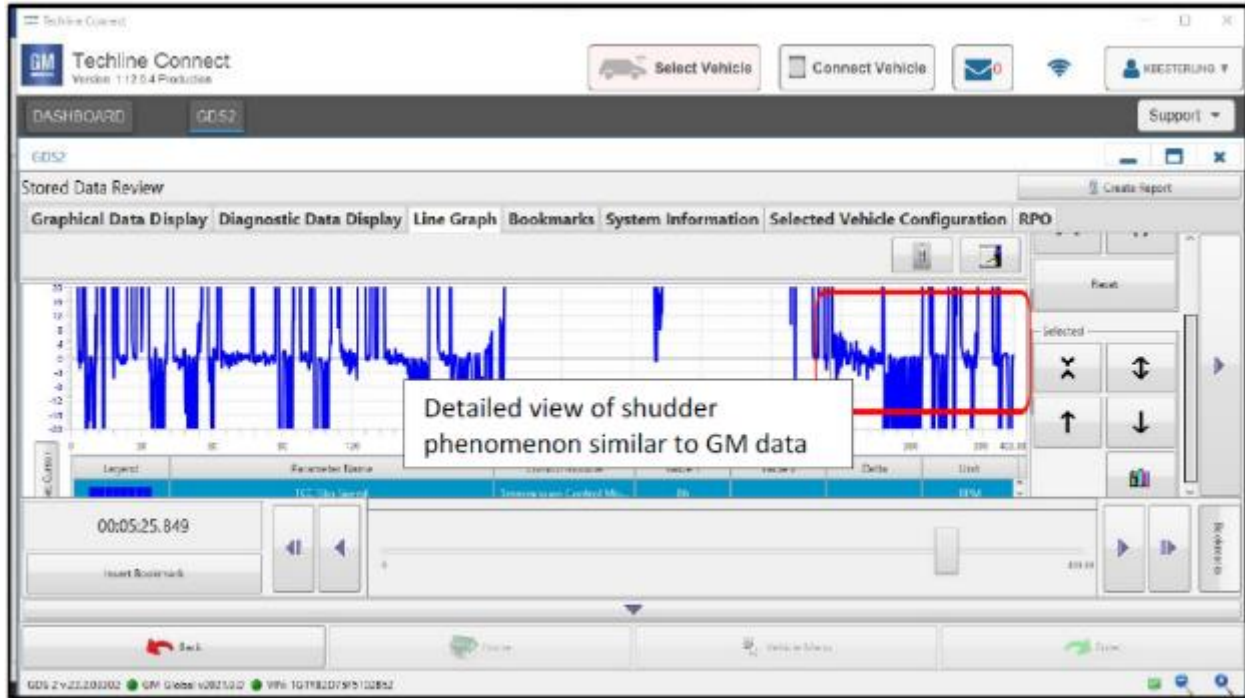


Figure 42. Figure from Dr. McVea's report, page 54⁴²¹ text in box in figure from Dr. McVea.

165. However, Dr. McVea identified the blue line as "calculated throttle position"⁴²² The blue line is not reflective of throttle position as it would not vibrate as illustrated in Dr. McVea's figure above. Also, throttle position percentage would not vary between negative 50 and positive 50.

166. GM's research of TCC shudder reported shaft speed vibrations indicative of the phenomena. Figure 43 is a replication of two slides from a GM presentation titled "Shudder 101" and dated August 27th, 2018. GM reported "Shudder occurs in certain operating conditions or as a result of clutch failure; Complex

⁴²⁰ Dr. McVea's Report, at page 53.

⁴²¹ Ibid, at page 54.

⁴²² Ibid, at page 53.

instability due to friction characteristics; Shudder does not follow any order of speed, but rather natural frequency of a powertrain member; and Correlation exists between negative clutch coefficient of friction vs slip speed slope behavior and shudder.”

423

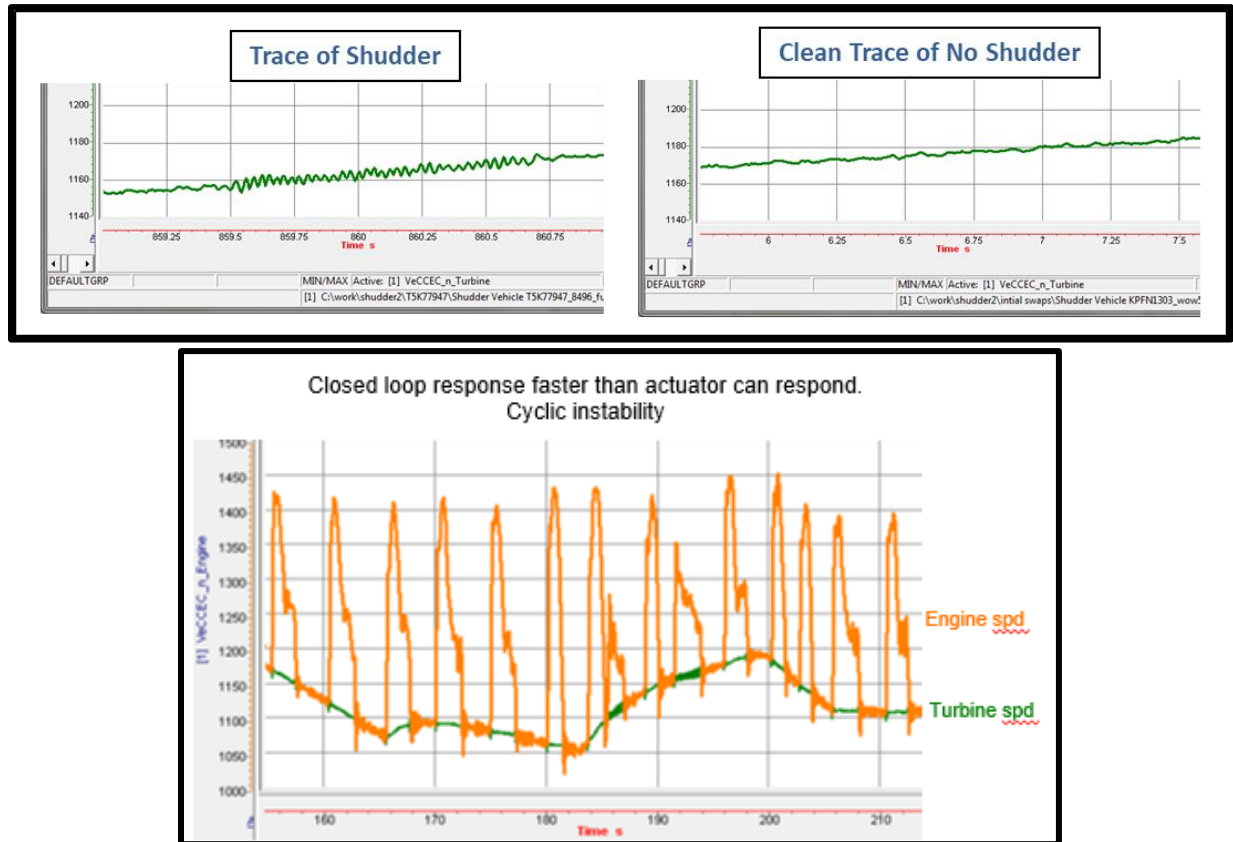


Figure 43. Shudder Vibration Phenomena (upper graph)⁴²⁴ and “Closed loop response faster than actuator can respond - Cyclic instability”⁴²⁵ (lower graph).

167. In the “cyclic instability” condition illustrated above, the engine speed trace (RPM) is oscillating (orange line). These oscillations occur over a brief time period. The transmission input shaft speed does not oscillate (green line). Dr. McVea does not show that the regions he marked with red boxes in page 54 of his report have the oscillations in shaft speeds or engine RPM

⁴²³ “Shudder 101”, 2018.08.28.GM000235446_X014936-PROD0008 (A).pptx

⁴²⁴ Ibid, at slide 11.

⁴²⁵ Ibid, at slide 12.

associated with TCC shudder or cyclic instability as presented in the examples of Figure 43.

168. Dr. McVea analyzed GM's efforts to address shudder concerns in pre-production Corvettes. He describes communications in which engineers discussed experiences with the 8L transmission in these vehicles.⁴²⁶ As Dr. McVea observed, GM engineers identified multiple different factors that could result in shudder "...email attributing the shudder to "an interaction of TCC friction material characteristics and 212B trans fluid." PX102 at 2"⁴²⁷, "Root cause of the 2015 program has not been identified but is believed to be the flat/negative friction slope of the LuK WFP friction material."⁴²⁸, and that "Shudder was found in low gear states during development of the 8L90 LTI Corvette. Mitigated the issue by not allowing torque converter clutch operation in gears 1-5." PX165 at 4."⁴²⁹

169. Dr. McVea addresses shift harshness.⁴³⁰ Factors that can influence the shift harshness includes the control algorithms, the hydraulic actuation of the transmission components, starting state of the transmission, as well as driver control inputs.

170. Dr. McVea describes GM communications explaining findings of harsh shifts, and steps GM had planned to improve the transmissions including products for future generations of vehicles models. These components include [REDACTED], and other hardware and software changes that are planned for future generations of GM transmissions, as shown in

⁴²⁶ Dr. McVea's Report at page 24.

⁴²⁷ Ibid, at page 25.

⁴²⁸ Ibid, at page 24.

⁴²⁹ Ibid, at page 25.

⁴³⁰ Ibid, at page 35.

Figure 44. The fact GM was planning future improvements or future transmissions is not evidence that a then-current component (transmission) was defective or presented an unreasonable risk to motor vehicle safety. Improvement efforts are constants in the automotive industry.

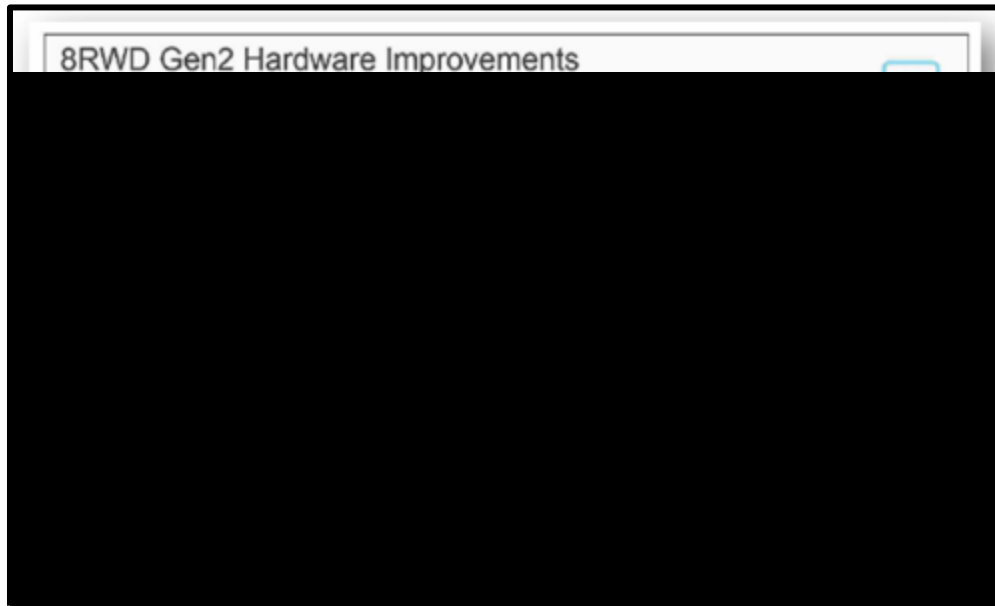


Figure 44. GM slide used in Dr. McVea's Report.⁴³¹

171. Dr. McVea also focused his comments of harsh shifts on Corvette primarily based upon what the GM engineers observed and did during the VDP prior to start of production.⁴³²

172. Dr. McVea's discussion of Corvette development extends into paragraph 73. He wrote "Even before launching the Corvette in 2014, GM test riders complained that the downshift to 1st gear was a "neck snapper," and that "tap shift no throttle 4-5, 5-6, 6-7,

⁴³¹ Dr. McVea's Report at page 38. Original document: 2021-04-15_H47944-0089-00000570_native (GM000875195).pdf page 7.

⁴³² Dr. McVea's Report starting at page 40.

7-8 kicks you in the butt really bad.” PX134 (GM00087212) row 85 and 96”⁴³³.

- a. In the original referenced document, one can see that the vehicle for which these comments were registered was “5 - 1FYN3017” a “Camoflaug*[sic]*” vehicle with “80%Powertrain Calibrations”, see the row highlighted in Table 5 below.
- b. The vehicle was in a development stage and not suitable for production release as the calibration had not been completed. It is inappropriate to forecast that a problem that registered on a vehicle in development would persist into production.
- c. The vehicle development process is deliberately intended to identify problems and correct them prior to final production release.

⁴³³ Dr. McVea’s Report ¶ 73 at page 40.

	FLEET NO.	VEHICLE MODEL	ENG	TRANS	SUSP	POWERTRAIN	ELECTRICAL	NOTES
1	1EYS2435 (Blue)	2014 MVBS Convertible	LT1	MYC / 2.56	Production FE1	2014 Production Powertrain Calibrations	Production Dimming Proposal Latest Cluster/Next Gen SW	
2	1XYS2433 (White)	2014 MVBS Convertible	LT1	MYC / 2.56	Production FE1	2014 Production Powertrain Calibrations	Production Dimming Proposal Latest Cluster/Next Gen SW	
3	1XYS2434 (Silver)	2014 MVBS Convertible	LT1	MEL / 3.42	Production FE1	2014 Production Powertrain Calibrations	Production Dimming Proposal Latest Cluster/Next Gen SW	
4	1EYS2418 (Silver)	2014 MVBS Coupe	LT1	MYC / 2.56	Production FE1	2014 Production Powertrain Calibrations	CTF1 SW	
5	1FYN3017 (Camouflage)	2015 Block 1 IV Coupe	LT1	M5U / 2.41	Production FE1 Production 2014 EPS cals with 2015 EPS SW	2015 80%Powertrain Calibrations	Performance Data Recorder Valet / Teen Driver Latest Cluster/Next Gen SW	
6	1FYN2802 (Camouflage)	2015 Block 1 IV Convertible	LT1	M5U / 2.73	Early Mero Tuned FE3 2014 PPV Shocks / Bars Production 2014 EPS cals with 2015 EPS SW	2015 80%Powertrain Calibrations Gears 1-4: TCC Off in Eco, Weather, Tour TCC on in Sport, Track	Valet / Teen Driver Latest Cluster/Next Gen SW	
7	X8D9015 (White)	2013 Porsche 911 Carrera S	3.8L Horizontally Opposed 6 Cylinder (400 HP)	DCT (7 Speed DCT)	PSM Sport Suspension ZF EPS			Porsche Dynamic Chassis Control Sport Exhaust System Automatic Stop Start
8	1FYN3040 (Night Race Blue)	2015 Block 2 IV Coupe	LT1	M5U / 2.73	Production FE4 2015 MR SW w/2014 cals Production 2014 EPS cals with 2015 EPS SW	2015 80%Powertrain Calibrations	Performance Data Recorder Latest AOS Hardware Valet / Teen Driver Gen 10 OnStar Latest Cluster/Next Gen SW	Latest AOS Hardware
9	1EYS2430 (Yellow)	2014 MVBS Coupe	LT1	MEL / 3.42	Production FE4	2015 80%Powertrain Calibrations	CTF2 SW	Revised Sport Seats Reported defective locking passenger seat belt

Table 5. List of vehicles tested from Exhibit 134 - GM000087212.xlsx, the row Dr. McVea identified is highlighted.⁴³⁴

173. Dr. McVea wrote “The ‘garage shift’ issue was also known in the Corvette pre-launch”.⁴³⁵ He quoted an email and stated “There were also complaints in May of 2014 where riders experienced ‘a 3 second delay while in 4Lo going from N to D. They think they are in gear when they put the selector in D then step on the gas. At that point they get a delay, flare, and a quick harsh engagement which causes the vehicle to lurch.’ PX202 at 1.”⁴³⁶ This email message identified the issue as “preliminary data on the first truck”, and is clearly not related to the Corvette,

⁴³⁴ Exhibit 134 - GM000087212.xlsx

⁴³⁵ Dr. McVea’s Report ¶ 75 at page 41.

⁴³⁶ Dr. McVea’s Report ¶ 74 at pages 40-41. Original document: H47944-0028-00179469 (Ref as PX202).msg

as the Corvette doesn't have a "4WD low" gear option nor is it classified as a truck. Dr. McVea has mixed the vehicle development findings and work across multiple vehicle platforms; his observations are not reliable. That he has confused the issues specific to a vehicle architecture does not make the issues he identified common to the putative class.

174. Dr. McVea does not demonstrate the harsh shift at issue is common for all the vehicle models in the putative class, nor that the performance conditions are common across the putative class.

175. Dr. McVea concluded "The Poor Shift Quality and Shudder Could Present a Safety Issue"⁴³⁷ and argues the transmission events may "startle or surprise the driver".⁴³⁸ His conclusion is justified based upon his personal driving experience and various complaints about harsh shifts.⁴³⁹

- a. He presented no evidence the shudder and harsh shift conditions present an unreasonable risk to motor vehicle safety, that is the criteria for determining a safety defect exists in a vehicle population.
- b. Dr. McVea's conclusion is at odds with decades of precedent by safety engineers that have not attributed safety defects to subjective interpretations of vehicle performance absent engineering and/or public health data evidencing unreasonable risk; no such data has been provided by Dr.

⁴³⁷ Dr. McVea's Report ¶ 93.

⁴³⁸ Ibid.

⁴³⁹ Ibid and ¶¶ 94-98.

McVea and no such data exists as regards transmission shift harshness and shudder in the subject transmissions.

Observations, Conclusions and Opinions

176. Motor vehicle internal combustion engines are vibration generators, and many vehicle components may have resonant frequencies that can be excited by various wind, road, and/or powertrain operating conditions; NVH⁴⁴⁰ is a fundamental task within the VDP.
177. Named Plaintiffs have registered very different experiences with their vehicles equipped with the subject transmissions in terms of service requirements and symptomatic presentation of the vehicle performance characteristics of which they complained. Some of their complaints seem unlikely to be related to the alleged transmission harsh shift and TCC shudder defects. They will not be able to present to the Court evidence of transmission malfunctions common to the class.
178. Plaintiffs' expert's disassembly and inspection of five subject transmissions showed differences in use, wear, component condition and repair status across the putative class. Evidence of use patterns, wear, component condition and repair status is not common to the putative class.
179. Motor vehicle manufacturers are required to collect data, conduct investigations, and make good faith determinations of safety defects that present an unreasonable risk to motor vehicle

⁴⁴⁰ NVH – Noise, Vibration, and Harshness engineering is an applied science focused upon reductions in noise and vibrational responses of automotive products.

safety. Manufacturers and NHTSA use consumer complaint information in defect investigations; consumer complaints may be useful for identification of trends or symptomatic presentation. They are not useful from an engineering perspective to quantify frequency of occurrence, characterize the nature and severity of a problem or malfunction, determine root cause of a problem or malfunction, or to develop and validate a remedy for the condition.

180. Multiple motor vehicle manufacturers have addressed consumer complaints of transmission shift harshness and shudder in TSB repair instructions. None have matured into safety defect determinations. NHTSA has never conducted a safety defect investigation for transmission shift harshness or shudder.

181. GM carefully considered the safety implications of harsh shift and TCC shudder on the subject transmissions and determined those subjective vehicle performance characteristics as characterized in the subject vehicles do not present an unreasonable risk to motor vehicle safety.

182. Plaintiffs and their expert have misinterpreted and misrepresented consumer complaints from various sources regarding the subject transmissions, including NHTSA VOQs.

183. Complaint conditions when presented and evaluated at dealers sometimes cannot be replicated. The determination of performance thresholds at which a condition becomes objectionable is subjective and dependent on variables in the vehicle and in the perception of the occupant.

184. TCC shudder has been addressed with a change to the ATF and future service repairs on the subject transmissions for shudder will be serviced with this corrective remedy. Should a vehicle develop shudder, the service repair is very likely to effectively correct the complaint condition.
185. Shift quality and transmission performance are elements defined by requirements and evaluated in GMUTS.⁴⁴¹
186. The GM 8L90 and 8L45 transmission architecture is applied to a broad range of vehicle types from sports cars to large pickup trucks and SUVs. The demands on the transmission vary with application. The transmission integration is unique to each vehicle architecture.
187. The GM 8L90 and 8L45 are not designs common to the putative class.
188. By model, months in service (MIS), model year, symptomatic presentation, and labor codes (a surrogate for cause) the GM8L90 and 8L45 have widely different shift harshness complaint and claims rates.
189. By model, MIS, model year, and geographic locale, the GM8L90 and 8L45 have widely different TCC shudder complaint and claims rates.
190. TCC shudder is localized to high humidity locales in the U.S. and U.S. territories.

⁴⁴¹ GMUTS – “General Motors Uniform Test System”; a system for subjective ratings made on a scale of 1 – 10. Higher values indicate better performance.

191. The design and service repair procedures used to address shift harshness have varied over time and have affected the putative class vehicles differently.
192. The complaint performance of putative class vehicle models for shift harshness is not uniform and does not grow uniformly over time.
193. Evidence regarding consumer complaints, warranty analyses, technical analyses, transmission designs, service conditions, and transmission performance for shift harshness is not common across the putative class.
194. The design and service repair procedures used to address TCC shudder conditions have varied over time and affected the putative class vehicles differently.
195. The complaint performance of putative class vehicle models for TCC shudder is not uniform and does not grow uniformly over time.
196. Evidence regarding consumer complaints, warranty analyses, technical analyses, transmission designs, service conditions, and transmission performance for TCC shudder is not common to the putative class.
197. GM provided continual improvement in identification of root cause and in providing countermeasures to address customers' complaints regarding transmission shudder and shift harshness. A total of 95 "Technical Service Bulletin" ("TSB") have been issued by GM between 2014-2020 related to 8L45 and 8L90 8-speed transmissions.
 - a. Of these 95 TSBs, 39 addressed transmission shudder and provided necessary diagnosis steps and repair procedures.

Eleven of these TSBs⁴⁴² required replacing the ATF with Mobil 1 Synthetic LV ATF DEXRON HP.

- b. Of the 95 TSBs, 30 TSBs addressed customers' concerns related to harsh shifts and included diagnostic steps to root cause the issue and the procedures to be performed by the technician. The required corrective procedures within these TSBs include "Performing Transmission Adaptive Values Learn Procedure",⁴⁴³ "Transmission Control Module Reprogramming",⁴⁴⁴ "Transmission Service Fast Learn",⁴⁴⁵ etc.

198. Performance of the subject transmissions for shift harshness and TCC shudder are not homogeneous across the putative class. There are significant variations in warranty repair probability as

⁴⁴² "GM TSB No.: PIP5337J, Shake Or Shudder On Acceleration",

"GM TSB No.: 16-NA-175, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at a Steady State",

"GM TSB No.: 16-NA-175, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at a Steady State - (Apr 19, 2017)",

"GM TSB No.: 16-NA-175, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at a Steady State - (Dec 13, 2017)",

"GM TSB No.: 16-NA-175, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at a Steady State - (Oct 11, 2018)",

"GM TSB No.: 18-NA-177, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at Steady Speed - (Oct 8, 2018)",

"GM TSB No.: 18-NA-177, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at Steady Speed - (Aug 6, 2018)",

"GM TSB No.: 18-NA-177, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at Steady Speed - (Jun 20, 2018)",

"GM TSB No.: 16-NA-175, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at a Steady State - (Jun 5, 2018)",

"GM TSB No.: 16-NA-175, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at a Steady State - (Sep 19, 2017)",

"GM TSB No.: 18-NA-355, Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH (40 and 128 KM/H) at Steady Speed - (Mar 30, 2020)"

⁴⁴³ e.g. "GM TSB No.: 14876, Service Update for Inventory Vehicles Only - 8-Speed Transmission Harsh Shift - Expires December 31, 2015 - (Dec 23, 2014)"

⁴⁴⁴ e.g. "GM TSB No.: 16-NA-411: Harsh 1-2, Harsh 3-1 Decel Downshift, Harsh Downshifts Under Heavy Throttle, AFM Transition and Step In Clunk During Downshift"

⁴⁴⁵ e.g. "GM TSB No.: 16-NA-412: Harsh 1-2, Harsh 3-1 Decel Downshift, Harsh Downshifts Under Heavy Throttle - (Mar 16, 2017)"

functions of: model, model year, geographic locale, and (for shudder) labor code (as surrogate for cause and remedy).

Conditions necessary for a finding of common defect do not present in the putative class. Some of the variations for claims vary by an order of magnitude or more.

199. Evidence of transmission design, failure symptom, system fault code, causal component, and repair remedy for the transmission malfunction is not common to the putative class.

200. Most of the subject vehicles have not been presented to a dealer for repair of shift harshness or TCC shudder.

201. The subject vehicles do not present an unreasonable risk to motor vehicle safety due to transmission shift harshness or TCC shudder; the subject vehicles do not exhibit a safety defect for transmission shift harshness or TCC shudder.

EXHIBIT 2

Message

From: Clyde A Bulloch [/O=GM/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=423728A16AC74FA2A69BA12D3B38E61B-MZB9BJ]
Sent: 3/19/2019 1:55:07 AM
To: Nancy A. McIntyre [nancy.a.mcintyre@gm.com]; David C Little [david.little@gm.com]; Michelle Yeagley [michelle.yeagley@gm.com]; David Simpson [david.simpson@gm.com]
CC: Eric S Jaquez [eric.s.jaquez@gm.com]; Darlena Wiegand [darlena.wiegand@gm.com]; Cheri N. Ruge [cheri.n.ruge@gm.com]; Norman Peralta [norman.peralta@gm.com]; William J. Goodrich [william.j.goodrich@gm.com]
Subject: RE: SUFS 458647442401 Submitted for 8RWD Transmission Sudder

Hi Nancy, I support moving forward for the unsold vehicle population and the CCA transmission service stock. I don't support a field action for all of the vehicles already in the field. Thanks, Clyde

From: Nancy A. McIntyre
Sent: Monday, March 18, 2019 2:15 PM
To: David C Little <david.little@gm.com>; Michelle Yeagley <michelle.yeagley@gm.com>; David Simpson <david.simpson@gm.com>; Clyde A Bulloch <clyde.bulloch@gm.com>
Cc: Eric S Jaquez <eric.s.jaquez@gm.com>; Darlena Wiegand <darlena.wiegand@gm.com>; Cheri N. Ruge <cheri.n.ruge@gm.com>
Subject: FW: SUFS 458647442401 Submitted for 8RWD Transmission Sudder

Hi David S,

I am understanding the issue may affect all 8 speed transmissions? Can you clarify model years? Which applications? The attached form has highlighted areas and red font for areas I will need clarification on

Hi Clyde,

I understand from talking to Eric Jaquez, that you are interested in pursuing a potential field action – Customer satisfaction action for unsold vehicles? **Can you confirm this is your desire?** Without that desire, I will be closing this issue based on quality issue with no executive support. If you do want to pursue a potential action, I will work to get this approved to a formal investigation in our process.

The SUFS verbatim submission is shown below:

How was the issue discovered (Incident Date, Who discovered and How)?

Warranty issue discovered and know about through live of 8RWD transmissions. New Oil available as break point starting in Q1 2019.

Have you previously communicated or documented this information? (If yes, provide documentation type and associated number. Ex. PRTS XXXXXXXX)

I work in Propulsion quality on the 8 Speed Transmission, I have lots of documentation of the issue.

Please describe the issue./Please describe the suggestion.

Torque Converter Shake and/or Shudder During Light Throttle Acceleration Between 25 and 80 MPH at Steady Speed

Vehicles get a rumble strip like vibration on smooth roads

**Exhibit
PX 182**

Looking to go after all vehicles built and not sold prior to delivery and install improved oil in transmission.

thanks

Nancy McIntyre

Safety Forensic Engineer - Emerging Issues Identification
Global Vehicle Safety
(586) 907 2556



From: Darlena Wiegand
Sent: Monday, March 18, 2019 12:51 PM
To: Nancy A. McIntyre <nancy.a.mcintyre@gm.com>
Subject: FW: SUFS 458647442401 Submitted for 8RWD Transmission Sudder

Hi Nancy,

This severity 2 is assigned to you. I have not replied to this email.

Thanks,
Darlena

From: David Simpson Hi DAvid
Sent: Monday, March 18, 2019 11:31 AM
To: Darlena Wiegand <darlena.wiegand@gm.com>; Eric S Jaquez <eric.s.jaquez@gm.com>
Cc: David C Little <david.little@gm.com>; Michelle Yeagley <michelle.yeagley@gm.com>
Subject: RE: SUFS 458647442401 Submitted for 8RWD Transmission Sudder

Hi Darlena and Eric,

Is there any further information on this SUFS and when it will go to SCCT? We are trying to determine if we can write a Service Bulletin asking dealers to change fluid when replacing transmissions now but have been told to wait until the SUFS process has gotten further.

Regards,
David Simpson
Program Quality Engineer (PQE)
8 Speed RWD Transmissions
(248) 653-4756

From: David Simpson
Sent: Monday, March 11, 2019 4:16 PM
To: Darlena Wiegand <darlena.wiegand@gm.com>; Eric S Jaquez <eric.s.jaquez@gm.com>
Cc: David C Little <david.little@gm.com>
Subject: SUFS 458647442401 Submitted for 8RWD Transmission Sudder

Hi Darlena and Eric,

Dave Little said that I should reach out to you regarding the SUFS we submitted for Shudder on 8 Speed transmissions. The thought is to go after built but not-sold vehicles, as well as the service transmissions currently at PDCs so that customers don't experience the failure.

SUFS # 458647442401 has been submitted in the system.

Regards,

David Simpson

Program Quality Engineer-8 Speed RWD Transmission

850 N. Glenwood Ave – Pontiac, MI 48340

(248) 653-4756 – david.simpson@gm.com



EXHIBIT 3



Deposition of:
Timothy J. Keenan

September 29, 2021

In the Matter of:
**Won, Wesley et al. v. General Motors,
LLC**

Veritext Legal Solutions

888.777.6690 | cs-midatlantic@veritext.com | 215-241-1000

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

WESLEY WON, et al., individually and
on behalf of all others similarly situated,
Plaintiffs

vs.

Case No. 2:19-cv-11044

Hon. David M. Lawson

Mag. Judge David R. Grand

GENERAL MOTORS, LLC

Defendant

Confidential Videotape Deposition of TIMOTHY J. KEENAN

Taken Via Remote Zoom Videoconference

Commencing at 9:05 a.m.

Wednesday, September 29, 2021

Stenographically reported by:

Joanne Marie Bugg, CSR-2592, RPR, RMR, CRR

1 APPEARANCES:

2
3 STEVEN G. CALAMUSA

4 Gordon & Partners

5 4114 Northlake Boulevard

6 Palm Beach Gardens, Florida 33410

7 561.333.3333

8 scalamusa@fortheinjured.com

9 Appearing on behalf of the Plaintiff.

10
11 PAUL D. COLLIER

12 Kirkland & Ellis

13 300 North LaSalle

14 Chicago, Illinois 60654

15 312.862.2000

16 paul.collier@kirkland.com

17 Appearing on behalf of the Defendant.

18
19 ALSO APPEARING VIA ZOOM VIDEOCONFERENCE:

20 Mark McVea

21 Tania Colunga

22 Douglas McNamara, Esq.

23 Vincent Maggiano - Concierge

24 Mike Gurlides- Videographer

25 Joanne Marie Bugg - Stenographer

1 look at, that would be great.

2 MR. MAGGIANO: Very good, sir. Okay. Bear
3 with me as I introduce it in exhibit share as well.
4 And, counselor, should we keep the same Exhibit Number
5 196?

6 MR. CALAMUSA: I think so.

7 MR. MAGGIANO: Very good.

8 MR. CALAMUSA: I think that's easier for
9 everybody. It'd drive them crazy if I changed it.

10 MR. MAGGIANO: It should be available now in
11 the marked exhibit folder. I'll bring it up on the
12 screen as well.

13 A. I see it.

14 BY MR. CALAMUSA:

15 Q. All right. Can you tell me when you have the
16 opportunity to take a look at it, then I just have a
17 few questions about it.

18 A. I have the document in my folder, and I've opened that.
19 So I can read that. I think I'm also seeing it on the
20 screen you're sharing.

21 Q. Okay. Is this a document that you're familiar with?

22 A. Yes.

23 Q. Okay. Have you reviewed this in preparation for your
24 deposition today?

25 A. Yes.

1 Q. And tell me what you recall about this. Do you recall
2 this timeframe as far as June of 2013?

3 A. Sorry. What was the last question?

4 Q. Sure. Do you recall the timeframe of June of 2013 where
5 you've -- June 24, 2013 where you experienced shudder
6 in the 8L equipped Corvette?

7 A. I do.

8 Q. Okay. And this would be prelaunch of the Corvette?

9 A. I believe so, based on the date.

10 Q. Yeah, because I think the Corvette didn't come out with
11 the eight speed until model year '15. Is that your
12 understanding?

13 A. Correct.

14 Q. All right.

15 A. Model year '15 Y1.

16 Q. Right. And so this vehicle would be a preproduction
17 vehicle that you're driving. And you say, "I drove
18 3003 LT1/M5U last Friday and the shudder is terrible."
19 Is that accurate?

20 A. That's what it says.

21 Q. Okay. And LT1 would be the engine RPO; is that correct?

22 A. That's correct.

23 Q. And M5U is the transmission. RPO, which stands for the
24 8L90 transmission in the Corvette?

25 A. That's right.

1 Q. All right. So you're driving a preproduction Corvette,
2 and you said the shudder is terrible?

3 A. Yep, yes.

4 Q. And you go on to say that, "I was unaware that we did
5 not implement the Borg 6100 TC material as discussed
6 last year when we went through the 2014 LT1/MYC shudder
7 investigation." So I want to talk a little bit about
8 that. MYC would be six speed, right?

9 A. That's right.

10 Q. Okay. So tell me about this shudder investigation that
11 ya'll did for the 2014 six speed vehicle?

12 MR. COLLIER: Objection. Scope.

13 A. The 2014 six speed with the Corvette, specifically, we
14 found a shudder phenomena at what we call PPV build
15 event at Bowling Green. That's where the Corvette is
16 manufactured. And we were doing a ride, a drive to
17 evaluate the performance, and shudder was found on that
18 ride on the six speed Corvette.

19 BY MR. CALAMUSA:

20 Q. Okay. And shudder, was it a torque converter shudder
21 that was identified?

22 A. The shudder observations and data collected there
23 launched an investigation with my team. The lead
24 calibrator, Jim Gessner, who may have been on here at
25 some point, and the Corvette driveline engineer, Roger

1 and says basically met with Gabe and Jim on Friday.

2 Who's Gabe, and who's Jim?

3 A. Jim Gessner was the lead calibrator on the Corvette
4 program. Gabe is Gabe Gibson. He was a lead clutch
5 control specialist on that program.

6 Q. Okay. So then he tells you, "The friction material on
7 the eight rear wheel drive is from LuK, who also
8 supplies the converter assembly. It not the BorgWarner
9 6100," which is the material that you had learned had
10 extra dampening from the previously email, correct?

11 A. I was asking if it would provide extra dampening. My
12 knowledge of Borg 6100, as I previously stated, was
13 that it had improved performance over MS022.

14 Q. Okay. And you specifically said with added dampening,
15 right, 6100 material with added dampening, right?

16 A. That's specifically how I worded the question to Rick.

17 Q. Okay. And then so, "Long story as to why the LuK paper
18 was chosen." Did he ever tell you the long story? Did
19 he bore you with that later, as he said?

20 A. I don't know the long story.

21 Q. Okay. So, "When Jeremy first ran in-vehicle gain in the
22 8RWD Y1XX," what is that?

23 A. Eight rear wheel drive. This just means the eight
24 speed that we're talking about, and Y1XX is the RPO for
25 Corvette.

1 Q. Okay.

2 A. Internal.

3 Q. Okay. "We didn't see the positive friction slope we
4 were expecting." So using the 6300 material from LuK,
5 they weren't seeing the positive friction slope they
6 were expecting, "And found a trace of shudder
7 transitioning through 30 rpm slip." Do you see that?

8 A. I do.

9 MR. COLLIER: Objection. Form. Scope.

10 BY MR. CALAMUSA:

11 Q. So that would be converter slip, correct?

12 A. That would be torque converter slip.

13 Q. And that would be shudder originating from the torque
14 converter transitioning through 30 rpm slip, correct?

15 MR. COLLIER: Objection. Form. Scope.

16 A. That would be shudder of the vehicle system as we moved
17 through a region of engine speed relative to turbine
18 speed.

19 BY MR. CALAMUSA:

20 Q. Okay. And this is not -- I'm sorry. Go ahead.

21 A. Yeah, sorry about that. Slip is just another
22 representation of engine speed and turbine speed, so we
23 use those kind of interchangeably.

24 Q. Okay. And so you did not do any of the testing on this
25 torque converter system that Rick is speaking about

1 A. I don't know that off the top of my head. Sorry.

2 Q. Since these items are discussed in this document as
3 potential solutions, you'd agree with me that not all
4 of these items -- well, let me ask you this. You don't
5 have any knowledge of when these items were actually
6 implemented into the first gen of the 8L transmission,
7 do you?

8 A. No. Not specifically.

9 Q. Okay. And despite the best efforts of implementing
10 these potential solutions that the consensus at General
11 Motors based upon the documents I showed you today, was
12 that a total redesign of the first gen of the 8L
13 transmission needed to occur in order to resolve some
14 remaining issues, quality issues for this transmission,
15 agree with that?

16 MR. COLLIER: Objection. Form. Scope.

17 A. Yeah, incremental improvements from Gen1 to Gen2 were
18 planned for meeting top quartile objectives. I agree
19 with that.

20 BY MR. CALAMUSA:

21 Q. Okay. So that there was issues with the Gen1 that could
22 not -- through GM's best efforts that could not be
23 resolved without a major redesign based upon the
24 documents I showed you. Agree with that?

25 MR. COLLIER: Objection. Form. Scope.

1 A. Yes.

2 DEPOSITION EXHIBIT 213

3 Email Thread GM000077934-GM000077935

4 2:01 p.m.

5 MR. CALAMUSA: All right. Let's go to a
6 document -- let's try this. Let's go to Tab 18
7 quickly.

8 MR. MAGGIANO: Is this going to be PX 213?

9 MR. CALAMUSA: It is.

10 MR. MAGGIANO: Stand by.

11 MR. CALAMUSA: Thank you.

12 BY MR. CALAMUSA:

13 Q. This might need to be blown up. And it's actually it's
14 on the second page from Mark Gordon to looks like a
15 Lisa. I'm trying to think who Lisa is here. And this
16 is going to be a quick one. We're going to be in and
17 out. Lisa Campbell. Do you know who Lisa Campbell is?

18 A. Doesn't ring a bell, no.

19 Q. Okay. And it says here: Lisa, warranty question. Is
20 the transmission control module reprogramming covered
21 under the 8/80 emissions warranty or base bumper to
22 bumper? I know the TSB referenced below only covers
23 through the base warranty only. But I've seen this
24 questioned a couple times before. I've seen this
25 questioned before." Do you know if the reprogramming

1 vehicles off at night in their driveway, and that would
2 be a normal use of the vehicle, correct?

3 A. Correct.

4 Q. Okay. And so that would be a foreseeable use of the
5 vehicle to shut it off at nighttime, and let it sit in
6 the driveway until morning to drive it, correct?

7 A. Yes.

8 Q. All right. And it says, "The harshness is worse on
9 vehicles that are driven at low speed subdivision
10 driving during that first shift." Do you see that?

11 A. I do.

12 Q. Okay. Are you aware that there are plaintiffs in this
13 case that feel like they've been rear ended on that 1-2
14 shift?

15 A. Yes.

16 MR. COLLIER: Objection.

17 BY MR. CALAMUSA:

18 Q. You can answer.

19 A. Yes.

20 Q. Okay. And are you aware that there's GM engineers that
21 have testified that it felt like a mule kick or a
22 donkey kick. That harsh shift that they've experienced
23 it as well?

24 MR. COLLIER: Objection. Form.

25 A. Yes.

1 BY MR. CALAMUSA:

2 Q. Okay. And have you experienced that harsh 1-2 shift?

3 A. Yes.

4 Q. Okay. And would you agree with me that's unacceptable
5 in any product regardless of whether it's GM or not?

6 MR. COLLIER: Objection. Form.

7 A. Yes.

8 BY MR. CALAMUSA:

9 Q. Okay. And would you agree with me that in 2020, 2/3 of
10 2020, that that problem still existed?

11 A. Yes.

12 MR. COLLIER: Objection.

13 BY MR. CALAMUSA:

14 Q. And it existed in the 8L family of transmissions, agree
15 with that?

16 A. I do.

17 Q. And that Mr. Gordon goes on to say, "Once the air is
18 purged from the clutch, subsequent shifts are
19 acceptable." And he says, "Engineering has attempted
20 different strategies with calibration to mask/improve
21 the shifts. Unfortunately, none of these strategies
22 have been effective and customers continue to
23 experience the harsh 1-2 shift." Do you agree with
24 that?

25 A. Yes.

1 Q. Okay. And hardware and calibration changes for the
2 second generation eight speed will address this and
3 other eight speed issues. Do you agree with that?

4 A. Yes.

5 Q. As I say, "Unfortunately, these changes will not take
6 place until after -- until model year '22." I'm sorry.
7 He says, "Unfortunately, these changes not take place
8 until model year 2022 for the midsize truck, and model
9 '23 for the remaining eight speed applications, GM
10 confidential." Do you see that?

11 A. I do.

12 Q. And do you agree with that?

13 A. Yeah. I'm not familiar with the midsize truck but, you
14 know, I agree with what's written here.

15 Q. Then it says, "TSB 16-NA-361 will be updated two more
16 times for the '21 and '22 model years. Unfortunately,
17 the overall shift quality of the eight speed has been a
18 big driver in customer dissatisfaction." Do you agree
19 with that?

20 A. Yes.

21 Q. Okay. So would you agree with me that this email is
22 written some six years after the initial, or actually
23 five and a half years after the initial launch of the
24 eight speed transmission?

25 A. Yes.

1 Q. Okay. And despite GM's efforts that they have not been
2 able to remedy the harsh 1-2 shift as described in this
3 document?

4 MR. COLLIER: Objection. Form.

5 A. Yes.

6 BY MR. CALAMUSA:

7 Q. And that the only way to remedy this harsh 1-2 shift is
8 by the redesign of the 8L transmission with the Gen2
9 program that's being slated for models year 2022 and
10 2023?

11 MR. COLLIER: Objection. Form.

12 A. Yes.

13 DEPOSITION EXHIBIT 221

14 Gamma Wall 8L45 Transmission Program

15 GM000876770-GM000876814

16 3:30 p.m.

17 MR. CALAMUSA: All right. Let's go to tab

18 38. And I think is this 221. Is that where we're at?

19 MR. MAGGIANO: Correct, 221.

20 MR. CALAMUSA: Thank you.

21 BY MR. CALAMUSA:

22 Q. Now, have you seen this document before?

23 A. No.

24 Q. Okay. And do you know what gamma wall means?

25 A. I believe so.

1 A. Exactly.

2 DEPOSITION EXHIBIT 223

3 Excel Spreadsheet GM000177110 - 10 Pages

4 4:35 p.m.

5 BY MR. CALAMUSA:

6 Q. All right. Okay. Let's go to -- I think it was a tab
7 that we had missed before, and maybe we have it now. I
8 think it's tab 21. Did we mark this document that I
9 was just looking at? We already marked it. So Tab 21
10 we have not marked, and I think it's Bates stamped 223,
11 if I'm not mistaken.

12 MR. MAGGIANO: Exhibit share, you can't open
13 exhibit share in Excel. So it's up in the program if
14 you need to open it. You can select download. I,
15 myself, am trying to open it right now.

16 MR. CALAMUSA: Tania, did you provide it to
17 -- I want to make sure Vincent has what you have,
18 Tania. So let's go off the record, because I want him
19 to be able to share the screen. Let's go off the
20 record.

21 VIDEO TECHNICIAN: Sure. We are going off
22 the record at 4:36 p.m.

23 (Off the record at 4:36 p.m.)

24 (Back on the record at 4:39 p.m.)

25 VIDEO TECHNICIAN: All right. We are back on

1 the record at 4:39 p.m. This marks the beginning of
2 media number number seven.

3 BY MR. CALAMUSA:

4 Q. Okay. All right, Mr. Keenan, do you see this document?

5 A. I do.

6 Q. This looks like -- it's a similar document to what we
7 looked at earlier. It's a PET document that you talked
8 about?

9 A. Yes.

10 Q. Okay. And at the top of the PET document it has model
11 year classification, and it says on this page the date
12 of it is June 22nd, 2015. And it says 2015, and it has
13 N2/C3, and then N1/C3. Do you know what that means?

14 A. No, not off the top of my head.

15 Q. Okay. And then it says underneath that program, and it
16 says 8L90 (M5U). And then underneath that it says
17 Corvette LT1/LT4. Do you see that?

18 A. I do, yes.

19 Q. So that would be the Corvette eight speed transmission?

20 A. Yes.

21 Q. And then next to it it says program. Next program
22 gate. Then it says launched. Do you see that?

23 A. I do.

24 Q. So that means the vehicle's in production, correct?

25 A. It might, yes.

1 Q. Well, it's June 15th of -- I mean, June 22nd of 2015
2 Corvette with the eight speed has already launched,
3 correct?

4 A. Launched could mean post SORP, but not necessarily
5 shipped to commerce. I don't know which is the case for
6 this word.

7 Q. All right. Well, June 22nd, 2015, they're selling
8 Corvettes with eight speed transmissions. Would you
9 agree with that, GM is?

10 A. Most likely, yes.

11 Q. Okay. And then we move on to the next column, and it
12 says lead vehicle FST L86, so that's full size truck?

13 A. It is.

14 Q. And L86, is it that the 6-2 or 5-3?

15 A. That's the 6-2.

16 Q. And then it says next program gate launched. Do you see
17 that?

18 A. I do.

19 Q. All right. And then if you look under product
20 engineering, it has Y's next to it. And then it has
21 status and comments regarding why it's a Y. So Y means
22 yellow; is that right?

23 A. Correct.

24 Q. And Y, is that like a yellow at a traffic light like
25 means caution?

1 A. Yes.

2 Q. Okay. And green is the goal that you're trying to
3 achieve?

4 A. Yes.

5 Q. And what does green mean?

6 A. All the targets met.

7 Q. Okay. And what does red mean?

8 A. Red would mean all targets not met.

9 Q. Okay. And for these two vehicles, would you agree with
10 me that under product engineering that the targets were
11 not met as of the date of this document relative to --

12 MR. COLLIER: Objection.

13 MR. CALAMUSA: You can go ahead.

14 MR. COLLIER: Objection. Form. Scope.

15 A. Your question was for product engineering, the targets
16 were not met. Where you see the two Y's, that's the
17 line you're asking me about?

18 BY MR. CALAMUSA:

19 Q. I am.

20 A. Yes.

21 Q. Okay. And then if you go down to quality, it has the
22 letter R there for red, which means that none of the
23 targets are met. Agree with that?

24 A. Yes.

25 Q. Okay. And it lists that there's 68,425 vehicles sold

1 as of June of 22nd, correct?

2 A. Yes.

3 Q. All right. And it talks about the issues that are being
4 experienced as of this time with respect to the
5 vehicles. Do you see that?

6 A. I do.

7 Q. And then it says 12 month IPTV is 88. Do you see that?

8 A. I do.

9 Q. Okay. Which is, again, about 2,000 percent higher than
10 the Gen2 target?

11 MR. COLLIER: Objection. Form.

12 BY MR. CALAMUSA:

13 Q. Do you see that?

14 A. Yeah, I see the 88. I do.

15 Q. And then it goes on to talk about the things that we
16 see in 2021 documents about what's going to be
17 addressed with the Gen2. Do you see that, the 3-1
18 downshift?

19 MR. COLLIER: Objection. Form. Yeah,
20 Objection. Form.

21 BY MR. CALAMUSA:

22 Q. Do you see where it says that there?

23 A. I'm missing where you're talking. You're just saying
24 earlier we talked about Gen2 transmission, and these
25 shift are part of that package? Is that your

1 statement? I'm not sure what you're asking.

2 Q. Yeah, we looked at the issues that have been complained
3 about that are driving the changes in Gen2. We looked
4 at documents from numerous people, and they spell out
5 what the problems are, the limitations are, Gen1, and
6 we've gone over this numerous times. And what I'm
7 talking -- what I'm pointing you to here is a document
8 that is, again, speaking about the same issues that the
9 gen -- this is about what Gen2's going to address. This
10 isn't saying Gen2 is going to address it. This is just
11 identifying that these issues existed in these
12 transmissions as of June 22nd, 2015. Would you agree
13 with that?

14 A. Yes, I agree with that.

15 Q. Okay. And the issues that appear that are under
16 quality in the Corvette transmission, and in the full
17 size truck transmission with 8L90s is that there
18 appears to be complaints with a 3-1 downshift. Do you
19 agree with that?

20 A. Yes.

21 Q. There's also 1-2 shift harsh complaints?

22 A. Correct.

23 Q. Okay. And there's a variety of other things listed. And
24 then you see where it says shift delay caused by torque
25 converter drain down?

1 A. Yes.

2 Q. Okay. So would you agree with me that the goal would be
3 to get the quality segment of this document into the
4 green zone for these programs?

5 A. Yes.

6 Q. Do you know if these programs ever got into the green?

7 MR. COLLIER: Objection. Form. Scope.

8 A. I'm not sure about at reviews. Generally those are
9 launch assessments. If we did those subsequently, I
10 would say the list of items there, you know, as you
11 stated, some of these symptoms occurred well beyond
12 into model year 2019 or 2020. So no solution identified
13 or not meeting metrics versus, you know, a marked
14 improvement, but still not meeting top quartile. You
15 know, that's probably the assessment these would have
16 been given in subsequent model years as we reviewed.

17 BY MR. CALAMUSA:

18 Q. And isn't top quartile just consumer expectations?

19 MR. COLLIER: Objection. Form. Scope.

20 A. It could be, yeah.

21 BY MR. CALAMUSA:

22 Q. Okay. All right. So you're not looking at best in
23 class. You're just looking to be -- to meet consumer
24 expectations by being in the top quartile. Agree with
25 that?

1 MR. COLLIER: Objection. Form. Scope.

2 A. It could be both.

3 BY MR. CALAMUSA:

4 Q. Right. And obviously you could be best in class. But
5 to get into the top quartile, you're just meeting
6 consumer expectations. That's what that means. It
7 doesn't mean you have to be best in class to be in the
8 top quartile, correct?

9 MR. COLLIER: Objection. Form. Scope.

10 A. I think you could be best in class, best in segment,
11 and top quartile, and meeting consumer expectations.

12 BY MR. CALAMUSA:

13 Q. I know doubt if you're those things you're meeting
14 everybody's expectations.

15 A. Right.

16 Q. Right. But if you're top quartile would be the top 75
17 percent and above, correct?

18 A. 75 percent of all consumers? What 75 percent of what?

19 Q. Well, what does top quartile mean to you?

20 A. That means you're meeting that 4.2 IPTV metric, or
21 you're meeting a J.D. Power or Compass metric, or all
22 areas cumulative.

23 Q. Okay. But not necessarily you don't have to be best in
24 class to be top quartile. Agree with that?

25 A. Possibly, yeah.

1 Q. All right. Okay. So let's go down to the next page. And
2 now this takes us into 2016. See it says May 4th,
3 2016?

4 A. Yes.

5 Q. All right. And if you look at product engineering and
6 quality for the same -- this expands the vehicles. Let
7 me just see here. These are 8L90 and 8L45 vehicles.
8 And it appears to include Corvette, full size truck,
9 and Camaro. Do you see that?

10 A. I do, yes.

11 Q. Okay. And would you agree with me that under product
12 engineering that they're all in the red?

13 A. Yes.

14 Q. For all the vehicles?

15 A. Yep.

16 Q. Okay. And, again, when a product is in the red when it
17 comes to these graphs, what does that mean?

18 A. Not meeting -- excuse me. Not meeting targets.

19 Q. Okay. So for product engineering for the 8L90
20 transmission, vehicles equipped with the 8L90
21 transmission in May of 2016, none of the vehicles with
22 the 8L90 that are listed here met targets, agree with
23 that?

24 MR. COLLIER: Objection. Form. Scope.

25 A. Yes.

1 BY MR. CALAMUSA:

2 Q. And if you look under this document, look at this
3 document, you also see under 8L45/90 it says poor first
4 shift of the day. Do you see that?

5 A. No. Where are you looking?

6 Q. If you go to the right hand column where it says
7 status/comment, and you go down, you see where the red
8 x's are?

9 A. I see it. Yes, I'm with you.

10 Q. All right. So first shift of the day is also identified
11 here as a problem with respect to the 8L90
12 transmissions and 8L45 transmissions?

13 A. Correct.

14 Q. And this is 2016?

15 A. Yes.

16 Q. Okay. And under quality, would you agree with me that
17 for all these vehicles it's an R for red that none of
18 these vehicles are meeting their quality targets?

19 A. Yes.

20 Q. Okay. And I think it says there's an IPTV of 105 for
21 model year '15. Do you see that?

22 A. I do.

23 Q. Okay. Which is several thousand percent higher than the
24 target for Gen2?

25 A. Correct.

1 Q. And then --

2 MR. COLLIER: Objection. Form.

3 BY MR. CALAMUSA:

4 Q. And then for model year '16, the IPTV is 75, which is
5 about 1,000 percent, I'm sorry, 2,000 percent higher
6 than the target for Gen1?

7 MR. COLLIER: Objection. Form.

8 BY MR. CALAMUSA:

9 Q. I'm sorry. For the target for Gen2.

10 MR. COLLIER: Same objection.

11 A. And 25 percent lower than the prior year, yes.

12 BY MR. CALAMUSA:

13 Q. Right. But would you agree with me it's still a
14 horrible IPTV. I mean, you're not saying that that's
15 an improvement?

16 A. No, I'm not.

17 MR. COLLIER: Objection.

18 BY MR. CALAMUSA:

19 Q. You'd agree with me that 75 is a terrible IPTV?

20 A. I agree with you that 75 is too high. Those programs
21 are red, but the efforts we were making made a
22 difference.

23 Q. Understood.

24 A. Still not acceptable. I have no argument there.

25 Q. Okay. All right. Let's move on to the next page. Okay.

1 We'll go to 2017. Any targets met with respect to
2 project engineering for the 8L45s or 90 vehicles that
3 are listed on this page?

4 A. No.

5 Q. Okay. And any target met -- any targets met relative to
6 2017 vehicles relative to quality listed on this page?

7 A. Nope.

8 Q. Okay. Do you think GM should have shared with consumers
9 that their quality targets were not being met for the
10 vehicles that they were selling in their showrooms?

11 MR. COLLIER: Objection. Form. Scope.

12 A. It's not my role to determine how, or when, or if we
13 communicate with consumers in any, you know, capacity.

14 BY MR. CALAMUSA:

15 Q. Would you want to know as an engineer if an OEM
16 manufacturer that was selling you a product wasn't
17 meeting their project engineering targets? They were
18 in the red?

19 MR. COLLIER: Objection. Form. Scope.

20 Improper hypothetical.

21 BY MR. CALAMUSA:

22 Q. You can answer.

23 A. Hypothetically, yes.

24 Q. You'd want to know, right?

25 MR. COLLIER: Objection. Form. Scope.

1 Improper hypothetical.

2 A. Um-hmm.

3 BY MR. CALAMUSA:

4 Q. And then with respect to an OEM not meeting their
5 quality targets for their transmission in their
6 vehicles, a vehicle that you were going to purchase,
7 would you want to know that before purchasing a
8 vehicle?

9 MR. COLLIER: Same objections.

10 A. I believe that information is available to any customer
11 who's going to purchase a vehicle. You know, J.D.
12 Power assessments are public data. So do you have the
13 opportunity to know that, yes.

14 BY MR. CALAMUSA:

15 Q. Let me make sure that I understand you correctly. J.D.
16 Power is going to know to a degree of certainty that GM
17 knows about them not meeting their internal quality
18 targets?

19 A. My point was that GM -- that J.D. Power has objective
20 assessments ratings for many customer segments. I know
21 many people who use J.D. Power data when they're going
22 to purchase a washing machine, or a vehicle, or
23 anything. So that's my point. J.D. Power does not know
24 where GM is meeting or not meeting targets. They simply
25 compile customer data.

1 BY MR. CALAMUSA:

2 Q. Yeah. So the point of what I'm saying is that GM
3 internally knows that they're not meeting -- I mean, do
4 you think J.D. Power knows that GM is not meeting its
5 engineering targets relative to these 8L transmissions?

6 MR. COLLIER: Objection. Form. Scope.

7 A. I think J.D. Power data summarizes where targets are
8 not being met. I think there's a strong correlation
9 between a high J.D. Power score, and vehicle
10 performance.

11 BY MR. CALAMUSA:

12 Q. Okay. My question is simply this. Does GM share its
13 project engineering data with J.D. Power?

14 A. No.

15 Q. Okay. Does GM share its project engineering data such
16 as we're seeing here on this document with consumers?

17 A. No.

18 Q. Okay. Does GM share its quality data that we're seeing
19 here on this document where they're not meeting their
20 benchmarks with J.D. Power?

21 MR. COLLIER: Objection. Form. Scope.

22 A. No.

23 BY MR. CALAMUSA:

24 Q. Okay. And does GM share with consumers the information
25 contained on this document where it's showing that

1 they're not meeting their targets?

2 A. No. And when these are green for other programs, we
3 also do not share that with customers or J.D. Power.

4 MR. COLLIER: Objection. Form. Scope.

5 BY MR. CALAMUSA:

6 Q. Appreciate that. So if it's in the red, you certainly
7 don't share with consumers, correct?

8 A. It's not standard practice to share whether it's red,
9 yellow or green with consumers or J.D. Power.

10 Q. I mean, is it standard practice at GM to remain in
11 production when they're not meeting their project
12 engineering targets for a transmission?

13 MR. COLLIER: Objection. Form. Scope.

14 A. I can't comment on that.

15 BY MR. CALAMUSA:

16 Q. Okay. I mean, do you think it's a good policy to
17 continue producing a vehicle when for years you're not
18 meeting your project -- product engineering benchmarks
19 for the transmission, or targets for the transmission?

20 MR. COLLIER: Objection. Form. Scope.

21 BY MR. CALAMUSA:

22 Q. What's that?

23 A. No, I do not.

24 Q. All right. Let's go down to the next slide. Again,
25 model year 2017 March. And this is a continuation of

1 the slide before. And do you see where it says 8L
2 and -- 8L90 and 8L45 transmissions?

3 A. Yes.

4 Q. Okay. And now it appears that it's going into 2018
5 model year. Do you see that?

6 A. Yes.

7 Q. Okay. And are any of the product engineering targets
8 met for 8L90 and 8L45 transmissions listed here?

9 A. No.

10 Q. Same thing for quality. Are any of the targets for
11 quality met relative to the 8L90 and 8L45 transmission
12 on this document for 2018 model year?

13 A. No.

14 Q. Okay. And, again, same question. Do you think it's a
15 good policy to go to market with products that are not
16 meeting product engineering targets?

17 MR. COLLIER: Objection. Form. Scope.

18 A. No, I do not. But this is also in parallel with if you
19 read the warranty in Compass under quality are
20 sufficiency plans that that was all targeted towards
21 the improvements that we had been working on up and to
22 that point.

23 BY MR. CALAMUSA:

24 Q. Okay. All right. Which do not affect vehicles that have
25 already been sold, correct?

1 A. Correct.

2 Q. So what I'm talking about is in the model year where
3 these improvements are not made, do you think it's a
4 good policy to be selling vehicles to consumers where
5 product engineering targets are not met relative to the
6 transmission of the vehicle?

7 MR. COLLIER: Objection. Form. Scope.

8 BY MR. CALAMUSA:

9 Q. You can answer.

10 A. No.

11 Q. All right. Let's go down to the next page. All right.
12 We now we move into the yellow phase for quality. And
13 this is into model year 2019. Do you see that?

14 A. I do.

15 Q. All right. So targets are still not being met regarding
16 product -- product engineering. Do you agree with
17 that?

18 A. Yes.

19 Q. Okay. However, with respect to quality for one segment
20 of vehicle for the 8L45 and the CTS, the target -- the
21 quality targets have been met for the CTS. Do you see
22 that?

23 A. I do.

24 Q. Okay. But yet for the alpha platform, what's the alpha
25 platform? I'm sorry. Alpha/GMT/K2XX, what is that?

1 A. Where we at?

2 Q. It says lead vehicle top left hand corner.

3 A. Alpha/GMT610/K2XX?

4 Q. Yep.

5 A. That would be alpha 8L90. So that would be CTS with
6 8L90. And the right hand column is CTS and CT6 with
7 8L45.

8 Q. Okay. So CTS would be before they went to the 10 speed.
9 Is that what that is?

10 A. Yes, correct.

11 Q. All right. And so the only vehicle that met the targets
12 for quality on this page is the CTS with the 8L45?

13 A. And CT6, correct.

14 Q. Sorry. And CT6, correct. All right. And would you agree
15 with me that on the documents that we've looked at, the
16 main driving force why these products were not meeting
17 quality targets was because of the transmission in
18 these vehicles?

19 MR. COLLIER: Objection. Form.

20 A. I think this is a transmission specific summary, so
21 yes.

22 BY MR. CALAMUSA:

23 Q. Okay. All right. We can move on from that document. And
24 there's a document I think that maybe -- Doug, are you
25 still on? Can you share the screen? Maybe not. Okay.

1 Q. All right. So GM looked at the perceived customer.
2 Well, when GM looked at what they were -- what they
3 could gain in customer satisfaction, which it appears
4 that if you look at the 2015/2016 Escalade, they could
5 actually double customer satisfaction if they did
6 option two. Do you see that?

7 A. Yes.

8 MR. COLLIER: Objection. Form.

9 BY MR. CALAMUSA:

10 Q. And despite GM's ability to double customer
11 satisfaction by doing option two, which would be adding
12 a new transmission, hardware and Mod1A oil, [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

22 Q. And then we get to now under the 2017 Escalade, if we
23 do option two, or option three, the lines are the same,
24 which is adding a new transmission hardware, and Mod1A
25 oil, you get to a level where the customer satisfaction

1 Q. And that's for model year '18 through '19 full size
2 pickup trucks?

3 A. Yes.

4 Q. Okay. Are any of these numbers numbers that you
5 participated in calculating?

6 A. No.

7 Q. Okay. And there's other pages with other numbers
8 regarding the calculations relative to the cost
9 associated with implementing these programs. Would you
10 rely upon the document for its accuracy?

11 A. Yes.

12 Q. Then let's move on. All right. How much time do I have
13 on the record? Let's take a five minute break. I got
14 one document left, and we'll just get through it, and
15 be done.

16 VIDEO TECHNICIAN: We are going off the
17 record at 6 o'clock p.m.

18 (Break at 6:00 p.m.)

19 (Back on the record at 6:09 p.m.)

20 VIDEO TECHNICIAN: All right. We are -- oh,
21 sorry. We are back on the record at 6:09 p.m.

22 BY MR. CALAMUSA:

23 Q. All right. Mr. Keenan, I put up a document that's been
24 previously marked as Plaintiff's Exhibit 224. And this
25 is the cover page for Plaintiff's Exhibit 225, which is

1 the decision record relative to the items that we were
2 just speaking about regarding recommendations, and to
3 improve the performance of 8L transmissions produced
4 from model years 2015 to model year 2020. Remember
5 speaking about that document?

6 A. I do.

7 Q. Okay. And then I think you said spoke to Norman Peralta
8 regarding that document before your deposition today,
9 in preparation for your deposition; is that right?

10 A. The document that we reviewed just before the break,
11 yes.

12 Q. All right.

13 A. I have not seen this document.

14 Q. This document is the same document. This is the cover
15 page for that document.

16 A. I see. We only looked at the graph portion of that.

17 Q. Right. Which is the top part of this document?

18 A. Okay.

19 Q. And there's an email where Norman is talking about
20 decisions relative to what to do based upon the options
21 that are -- that GM is exploring for these
22 transmissions that we've spoken about, okay?

23 A. Okay.

24 Q. And did you -- you had a discussion with Norman about
25 those options before your deposition today?

1 A. We spoke yesterday. That was the only communication we
2 had. And it was really clarification on the chart that
3 we reviewed that is apparently up in this same slide
4 deck you're sharing.

5 Q. Okay. And so when you said that the boxes were checked
6 no, you said that because you had spoken to Norman and
7 knew that none of these options were selected for any
8 of these transmissions; is that accurate?

9 A. No. I was assuming that the check marks that were off
10 on the right margin there were indicative of the no
11 boxes, but I think you actually pointed out that they
12 would be dragged over to one of yes or no boxes when
13 the decision was made. So I don't think what I said was
14 what you're suggesting.

15 Q. No, what I'm saying is this is that you spoke to Norman
16 after this about a year after this document was
17 written, which is actually a year and a half. You
18 spoke with him yesterday?

19 A. Right.

20 Q. And you said you testified a little while ago that you
21 were under the impression that none of these changes
22 were implemented. [REDACTED]

[REDACTED]
[REDACTED].

25 Remember you said that?

1 A. Yeah. I think what I said was the [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

6 Q. Okay. Well, that's certainly a nicer way of saying it.
7 And but the end result is that nothing was done for
8 consumers that had model year '15 through '19 8L
9 vehicles with a Gen1 transmission as far as the
10 proposals that were recommended here on this document
11 that I've marked as Plaintiff's Exhibit Number 225.
12 None of those proposals were carried out, agree with
13 that?

14 A. I haven't read this whole page that you're sharing
15 here. Are you saying that it states what you just said?

16 Q. No. We can go back -- go back to the top of the
17 document. Okay. Go up. Okay. Is it your understanding
18 that any -- did Norman tell you any of these programs
19 were implemented?

20 A. He did not.

21 Q. Okay.

22 A. He also didn't tell me that any of these were not
23 implemented. So I guess I can't tell you if the top
24 line was executed, or any of them. But I don't believe
25 the option two or one were executed.

1 Q. For either model year '18 or '19, correct?

2 A. Right.

3 Q. And you're not sure if model year -- if this
4 exercise -- let's put it this way. You're certain that
5 option one and option two was not exercised -- was not
6 offered for model year '15 through '17 vehicles with
7 the 8L transmission; is that accurate?

8 A. Because it's -- option one and two are not on this
9 document as in scope for '15 through '17. So based on
10 that, I would say I'm certain it was not offered or
11 executed.

12 Q. And then for model year '18 and '19, it's your
13 understanding that option one and option two was not
14 implemented as well?

15 A. That's my understanding.

16 Q. Okay. And is that based on talking to Norm?

17 A. Yes.

18 Q. Okay. And then with respect to what was implemented
19 relative to model year '15 and '17, you're not sure if
20 this service playbook and applying the goodwill tools
21 was implemented, are you?

22 A. I'm not.

23 Q. Okay. Do you know what the goodwill tools are?

24 A. I don't know what service play playbook or goodwill
25 tools are, no, I don't.

1 Q. Okay. And then if we scroll down on this document, and
2 then I'll go to other one document, then we're done.
3 Scroll down. Keep on going. Go up. Okay. Right there.
4 There's an email from Norm to Chris Meagher, and
5 copying Michelle Yeagley. And it says, "Model year '15
6 through '17 most likely candidates for do nothing." Do
7 you see that?

8 A. I do.

9 Q. Okay. And is that what Norm shared with you that model
10 year '15 through model year '17 owners of 8L vehicles
11 were candidates for a do nothing program by GM?

12 MR. COLLIER: Objection. Form.

13 A. He did not say the words do nothing. He did not share
14 that, or we did not talk about it. So I can't tell you
15 if anything, you know, was documented above in goodwill
16 tools, or any of that thing was done. I can't answer
17 that.

18 BY MR. CALAMUSA:

19 Q. Okay. What's your understanding of a -- being a
20 candidate for do nothing?

21 A. Do nothing could be no valve body. It could be no
22 transmission. It could be no oil. I don't know. I don't
23 know what the context of that was.

24 Q. Okay.

25 A. I would put that in the context of option one and two

1 that we discussed earlier.

2 Q. That you weren't going to -- that that was not going to
3 happen?

4 A. Right.

5 Q. Okay. Does do nothing imply that you do anything?

6 MR. COLLIER: Objection. Form.

7 A. What I see here is candidates for do nothing, owner
8 loyalty certificate or extended component coverage.
9 And it says most likely candidates, so to me it means
10 potentially there was a loyalty certificate and/or
11 extended component coverage.

12 BY MR. CALAMUSA:

13 Q. Okay.

14 A. I can't speak to what do nothing means on this bullet.

15 Q. All right. What does do nothing mean to you? Like if
16 I said I'm going to do nothing for you, does that imply
17 I'm doing anything for you?

18 MR. COLLIER: Objection. Form.

19 A. No, it doesn't.

20 BY MR. CALAMUSA:

21 Q. Okay. All right. Do you think it has any different
22 meaning in this document than it does in everyday life
23 what do nothing means?

24 A. I think if that bottom bullet where it says model year
25 '15 through '17 most likely candidates for do nothing,

1 if that sentence or statement ended right there, I
2 would agree that what you just said is true. After
3 that, there are a few other items that suggest that
4 maybe the customers were candidates for those items.

5 Q. Okay. So there was an option, a selection here between
6 candidates for do nothing being one option. Agree with
7 that?

8 A. Yeah.

9 Q. Option two would be owner loyalty certificate, right?

10 A. Yes.

11 Q. And then it's an or, not an and. It says, "Or extended
12 component coverage."

13 A. Yes.

14 Q. Okay. Do you know which of these options the model year
15 '15 through model year '17 owners of vehicles with 8L
16 transmissions received?

17 A. No, I do not.

18 Q. All right. Last document, Plaintiff's Exhibit 121.

19 MR. COLLIER: You're pushing it, Steve.

20 MR. CALAMUSA: All right. I'm done. This is
21 like two pages of it, and I'm done with this thing.

22 MR. COLLIER: All right.

23 MR. CALAMUSA: Come on, Paul. You know you
24 love this.

25 MR. COLLIER: I may pass out. I don't know

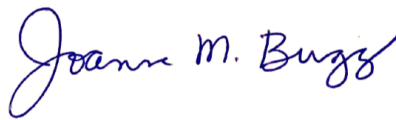
CERTIFICATE OF NOTARY

STATE OF MICHIGAN)

) SS

COUNTY OF WAYNE)

I, Joanne Marie Bugg, certify that this remote deposition was taken before me on the date hereinbefore set forth; that the foregoing questions and answers were recorded by me stenographically and reduced to computer transcription; that this is a true, full and correct transcript of my stenographic notes so taken; and that I am not related to, nor of counsel to, either party nor interested in the event of this cause.



Joanne Marie Bugg, CSR-2592

Wayne County, Michigan

My Commission expires: 2-26-2025

EXHIBIT 7

Message

From: Peter Radecki [/o=GM/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3f7b60b15575412ba930033f5e8b4b10-RZMCQR]
Sent: 8/27/2018 8:18:55 PM
To: Jerry Beemer [jerry.beemer@gm.com]
CC: Robert J. Gonzales [robert.j.gonzales@gm.com]; Andrew Scheich [andrew.scheich@gm.com]; Shawn B. Look [shawn.b.look@gm.com]; Eric M Skibba [eric.skibba@gm.com]; Randy L. Melanson [fzh6r6@nam.corp.gm.com]; Victor M. Roses [victor.m.roses@gm.com]; Michael J. Grimmer [michael.j.grimmer@gm.com]; Richard B. Vykydal [sz8lf2@nam.corp.gm.com]; Tim Anguish [tim.anguish@gm.com]; Dan Cashatt [paul.cashatt@gm.com]; Amogh Deo [amogh.deo@gm.com]; Ted R. Skrzycke [ted.r.skrzycke@gm.com]; Jean M. Schweitzer [zzmqcb@nam.corp.gm.com]; Craig Reynolds [craig.reynolds@gm.com]
Subject: TCC Shudder 101 Background Review Slides
Attachments: DewPt_MonthDelayed.mp4; Shudder 101 27AUG18.pptx

Hi Jerry,

Thanks for meeting with us today. Attached are the TCC Shudder 101 slides and 8-spd warranty video. Please let us know if you have any questions.

Thanks,
Peter

Peter Radecki, Ph.D.
Transmission Development Engineer
GM Global Propulsion Systems
peter.radecki@gm.com
C 248.828.5864



Exhibit

PX 0570

SHUDDER 101

Monday, August 27th, 2018



AGENDA

SHUDDER PHYSICS & ROOT CAUSE TREE'S (A. Scheich/R. Melanson)

VEHICLE & POWERTRAIN RESPONSE (P. Radecki)

MEASURED VEHICLE ATF MU-V SLOPE VS SHUDDER PROPENSITY (P. Radecki)

8spd and GF9 Shudder Lessons Learned (A. Scheich)

LEGACY PROGRAMS WITH CONCERNS (A. Scheich)

BACKUP

GENERAL MOTORS

SHUDDER PHYSICS & INVESTIGATION TREE

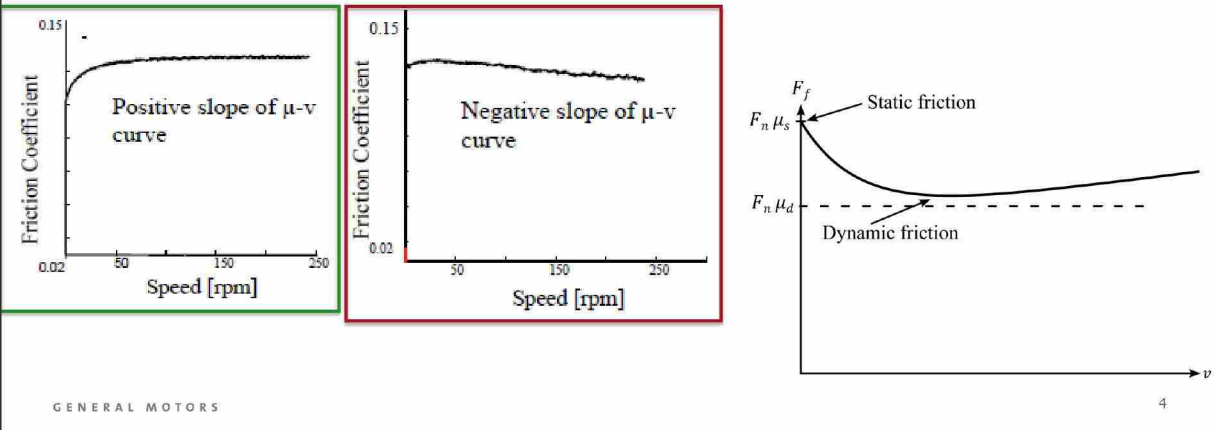
Andrew Scheich

GENERAL MOTORS

3

FRICITION INDUCED VIBRATION (DEFINITION)

- Shudder occurs in certain operating conditions or as a result of clutch failure.
- Complex instability due to friction characteristics.
- Shudder does not follow any order of speed, but rather natural frequency of a powertrain member.
- Correlation exists between **negative μ -v slope behavior and shudder**.



Shudder is a Friction induced vibrations or stick-slip that occurs in the wet clutch systems for certain operating conditions or as a result of clutch failure.

Complex instability due to friction characteristics similar to brake shudder.

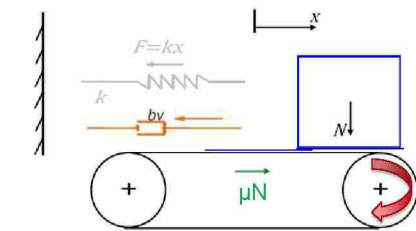
Shudder does not follow any order of speed, but rather natural frequency of a powertrain member.

Correlation exists between negative μ -v slope behavior and shudder.

In summary Stick-slip occurs when the static coefficient of friction exceeds the dynamic coefficient of friction.

FRICITION INDUCED VIBRATION (PHENOMENON)

- Instability: Force needed to start the motion is higher than what is needed to maintain sliding.
 - Static coeff. > Dynamic coeff.
- When spring force exceeds friction force, motion occurs.



Static Friction:

Initially: $kx < u_s N$

Motion starts: $kx \geq u_s N$

Dynamic friction:

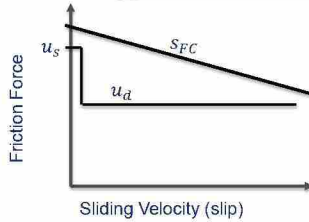
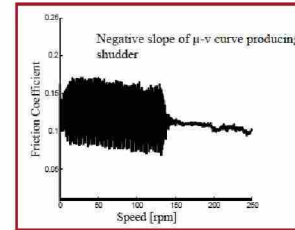
Block slides left: $kx \geq u_d N$

Motion stops: $kx \leq u_d N$

Static Friction:

Repeat: $kx < u_s N$

This leads to continuous speeding up (**slip**) and slowing down (**sticking**), or stick slip vibration.



$b = \text{System Damping}$, $s_{FC} = \text{Friction Curve Slope}$

Block Equation of Motion:

$$s_{FC}(v)N = ma + (b + s_{FC})v + kx$$

Positive damping: (e.g. under, critical, over)
 $(b + s_{FC}) > 0$

Marginally Stable: (no damping)
 $(b + s_{FC}) = 0$

Unstable: (shudder, poor TCC ctrl)
 $(b + s_{FC}) < 0$

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Images from Luk Rashid Farahati ⁵

Phenomenon is when the force needed to start the motion is higher than what is needed to maintain sliding. For a moving system the applied force increases until it is higher than the maximum static friction force.

#1 - The static friction is sufficient to encounter the spring force and thus the force balance is equal.

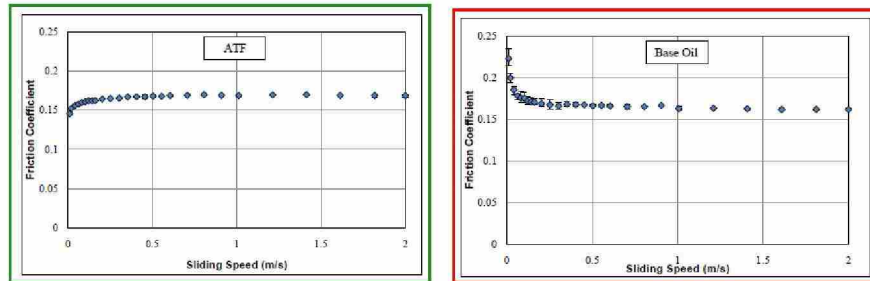
#2 - The dynamic friction force is insufficient to encounter the spring force, therefore the block slides to the left.

#3 - The relative motion between the block and belt decreases and therefore static friction is achieved balancing the forces once again.

#4 - The process repeats itself and is thus the oscillatory velocity. This leads to continuous speeding up (slip) and down (sticking), or stick slip vibration. Example to the right.

WHAT CAN CAUSE NEGATIVE μ -V SLOPE BEHAVIOR

- Inadequate ECCC Friction System Design
 - ATF (controls majority of friction curve shape)
 - Friction Modifier (FM) Package sub-optimized for anti-shudder durability
 - FM package not durable
 - Friction Material Design
 - Reaction Surface Design
- Mechanical Degradation
- Thermal Degradation (Improve of "Normal" Sump Temps for A.T.M.)



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6

Many characteristics can lead to Negative Friction Slope (Characterized in later Fishbone Diagram)

Inadequate FMs at start of life (do not sufficiently reduce static friction levels – low mileage shudder)

Inadequate FM durability (does not maintain low static friction levels over product life – medium to high mileage shudder)

Sensitivity to chemical and environmental contaminants e.g. silicone, water:

Above certain concentration it is considered detrimental (Varies by ATF).

Can Enter from cooling system, condensation from atmosphere humidity, or operating in a water (flooded area) environment etc.

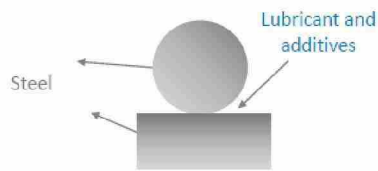
Water is a polar molecule and attracts additives which are polar in nature i.e. friction modifiers. Synthetic Fluids such as what's in the 8spd are much less robust to water than our traditional mineral based ATFs.

Friction Material Selection (i.e. 6RWD ex. MS022 is negative by design)

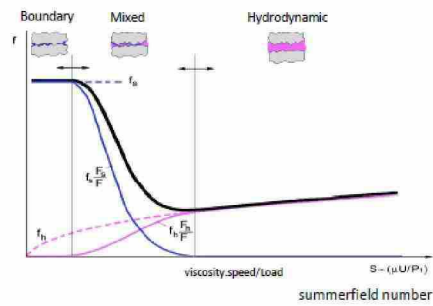
Mechanical Degradation (i.e. 6RWD ex. If contact pressure limit exceeded)

Thermal Degradation (i.e. 8RWD K2xx MY15 SOP interface temperature above 141 deg.C)

STRIBECK CURVE



Typical tribological contact; non porous solid on solid.



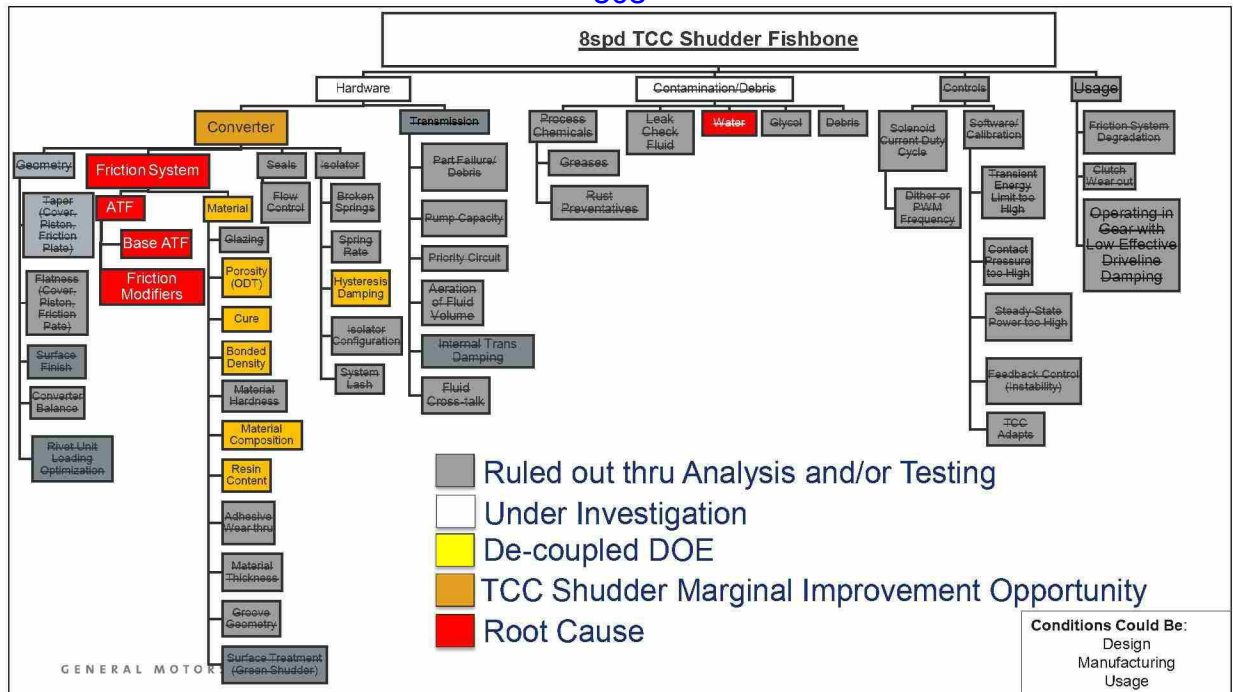
Stribeck curve is the most common method for addressing various tribological contacts. Stribeck investigated friction of journal bearing. His investigation was remarkable for sliding bearings as he showed the possibility of finding a point of minimum friction for lubricated application*.

*B. Jacobson, The Stribeck memorial lecture, Tribology International, 2003.

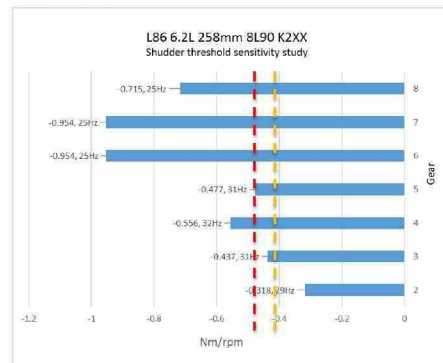
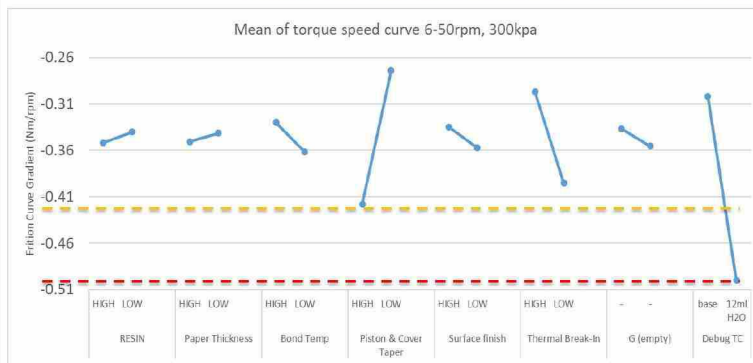
GENERAL MOTORS

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8SPD SHUDDER HARDWARE DOE

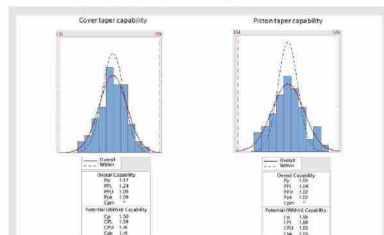


- Several potential Shudder Red-X hardware parameters evaluated (All do NOT provide significant negativity of friction curve to explain Shudder).
- Taper had the largest effect after contribution of water, but if we Look at Luk's capability they're using the full specification today.

GENERAL MOTORS

Shedlin Investigation
GM 258mm 8-Speed Taper Capability After Machining

SCHAEFFLER



VEHICLE & POWERTRAIN RESPONSE

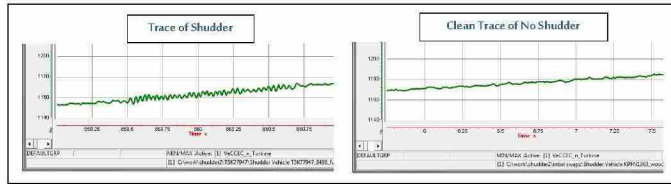
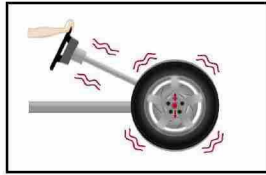
Peter Radecki

GENERAL MOTORS

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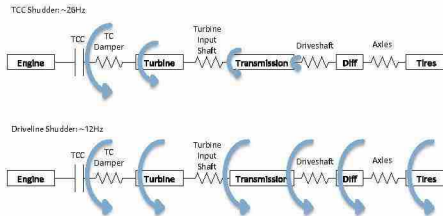
Vibration Phenomenon

Shudder:



Shudder can take on multiple mode shapes depending on powertrain and driveline mass, stiffness, and damping properties.

8L90 Full Size Truck mode shapes are shown below:



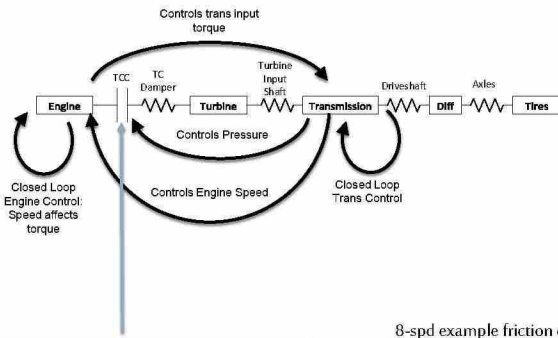
TCC (shudder/control) is the fuse for many types of system integration failures.

GM Confidential

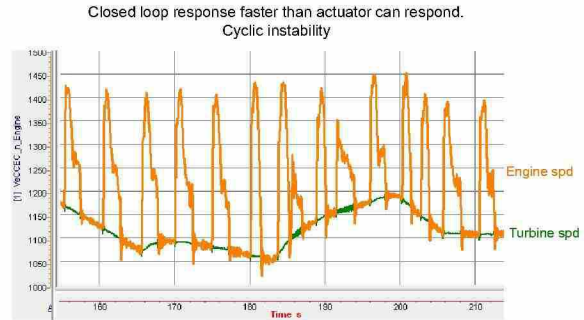
12

Clearly explain phenomenon
Significance of warranty cost

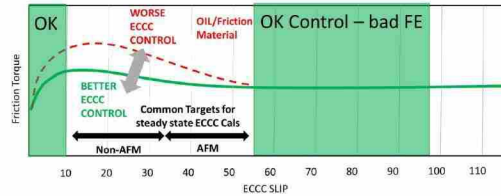
Controls Background & Impacts



Friction System instability can destabilize closed loop systems



8-spd example friction curve



GM Confidential

Example Performance Traces

Torque converter shudder is nonlinear vibration instability due to a negative friction curve on the torque converter clutch.

Shudder vibration occurs at the clutch interface while the clutch is slipping.

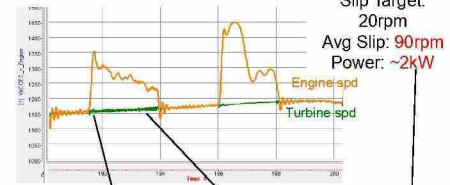
For paper friction materials, glazing can occur on lining surface if interface is over-temperature

Degraded friction systems result in poor controllability/shudder.

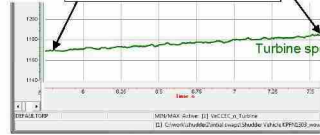
Normal Friction System Performance



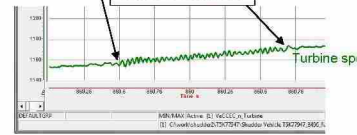
Degraded Friction System Performance



Clean Trace of No Shudder

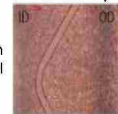


Trace of Shudder



Control performance impacts long-term durability.

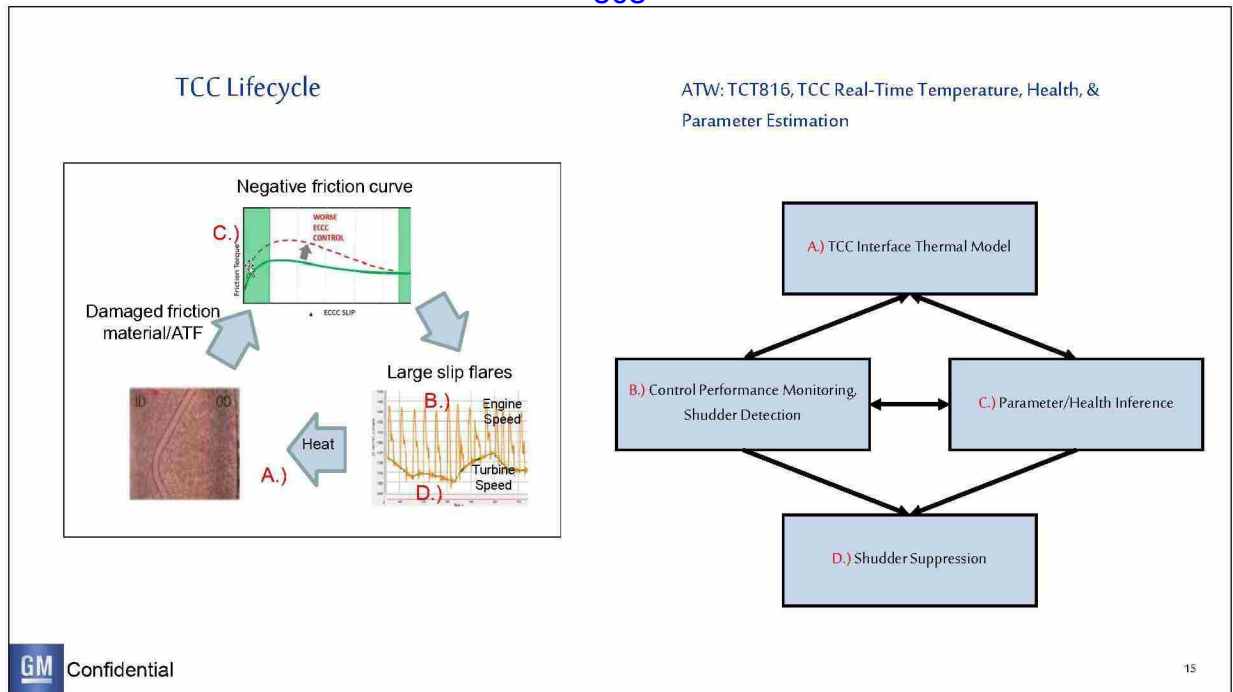
Glazed friction material



Confidential

14

14



Explain

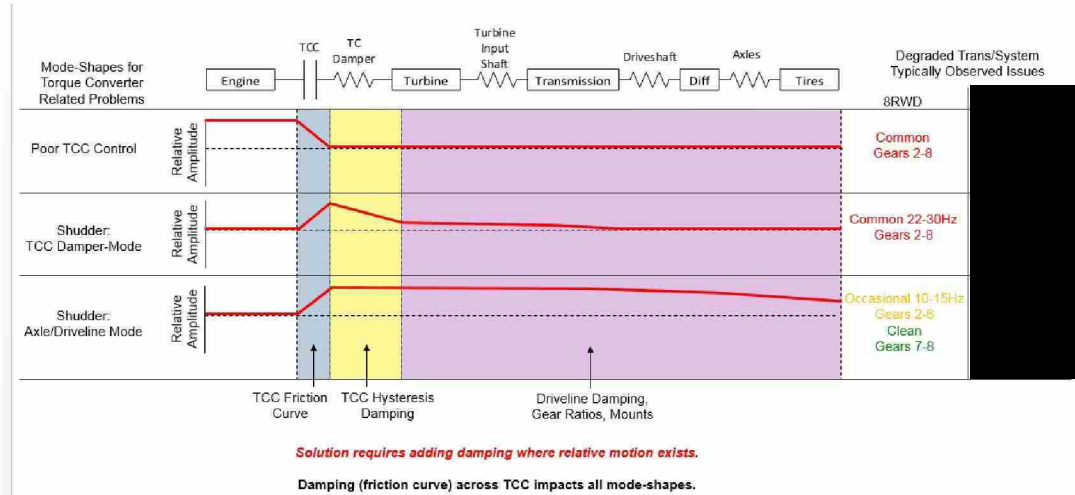
MEASURED VEHICLE ATF MU-V SLOPE VS SHUDDER PROPENSITY

Peter Radecki

GENERAL MOTORS

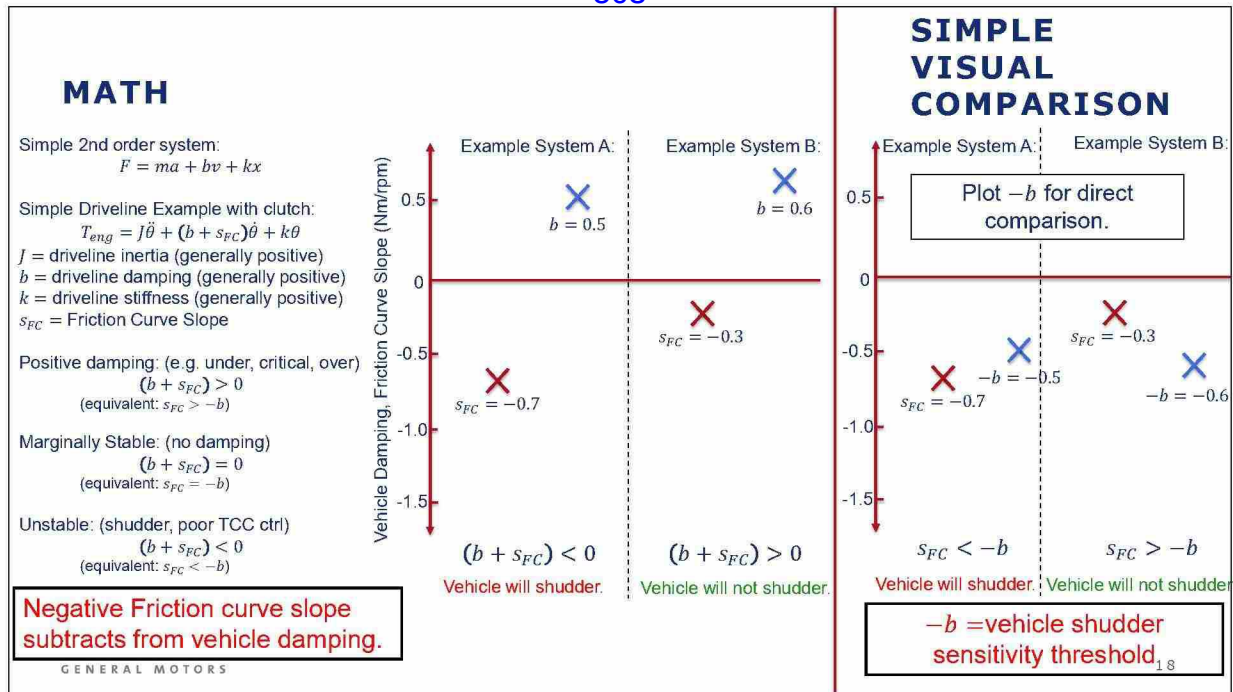
16

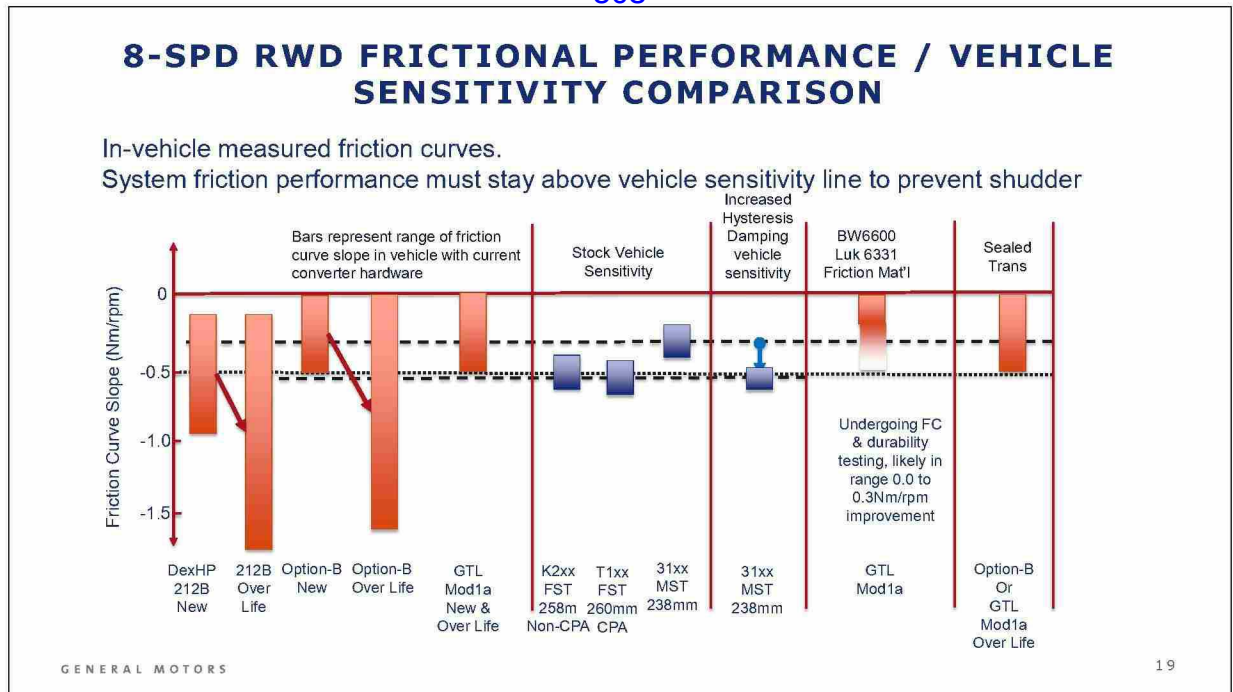
IMPACT OF DAMPING ON SHUDDER

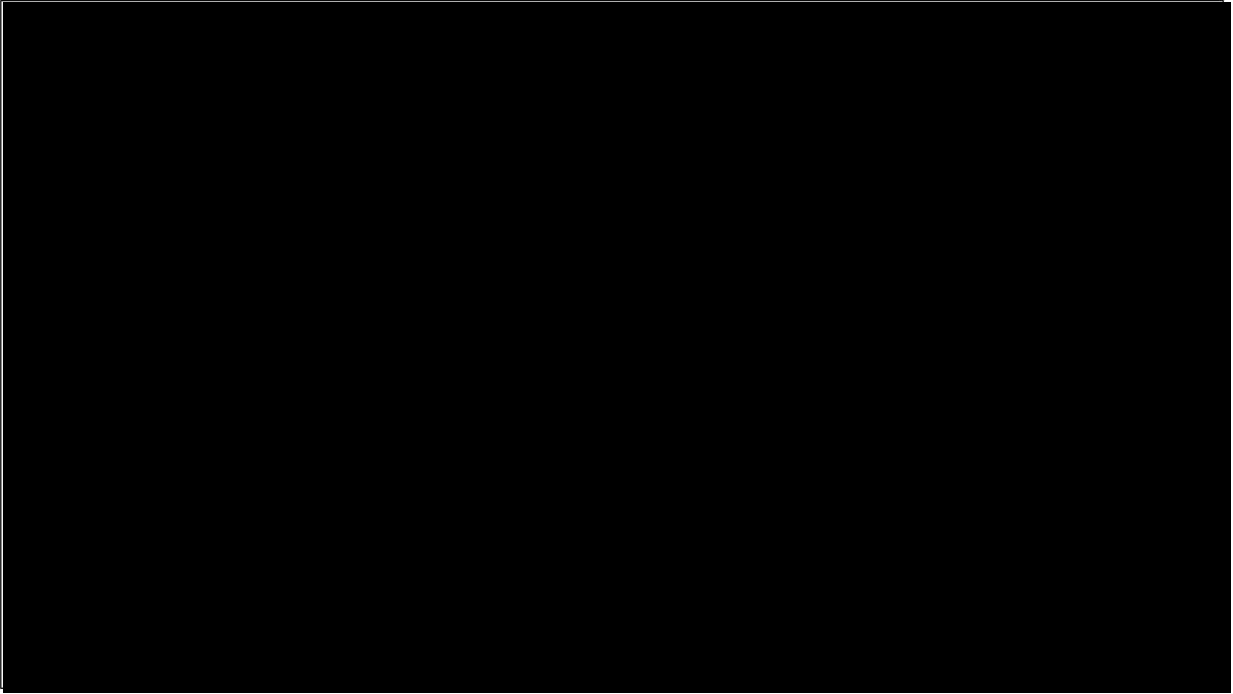


GENERAL MOTORS

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Starting Devices Integration

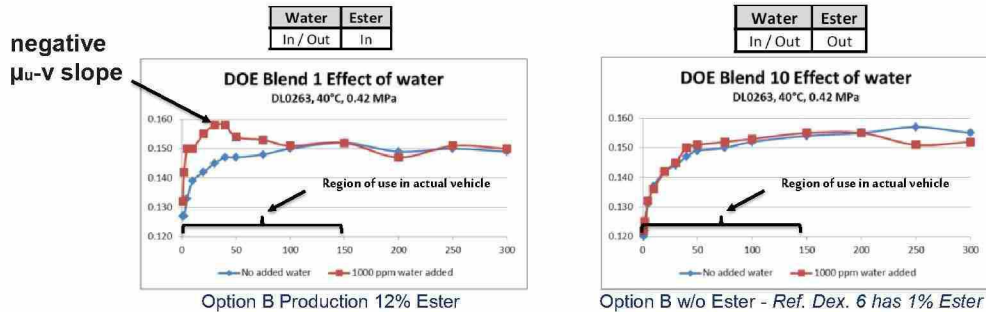
Lessons Learned from Shudder Investigations – 8 spd

Root Cause:

- Negative friction curve slope leads to TCC or Driveline Shudder (Stick-Slip Phenomenon)
- In the case of 8spd ATF (Dexron HP & Option B), significant friction curve degradation observed in the presence of water.

Findings:

- ATF design did not comprehend side-effects of increasing Ester and thus is more sensitive to 0.1% water concentration limit than other production ATFs (Dex. 6 & ULV) in similar vehicle architectures.
- Plan for ATF and torque converter clutch (TCC) friction performance did not incorporate potential sources of noise (i.e. environmental).

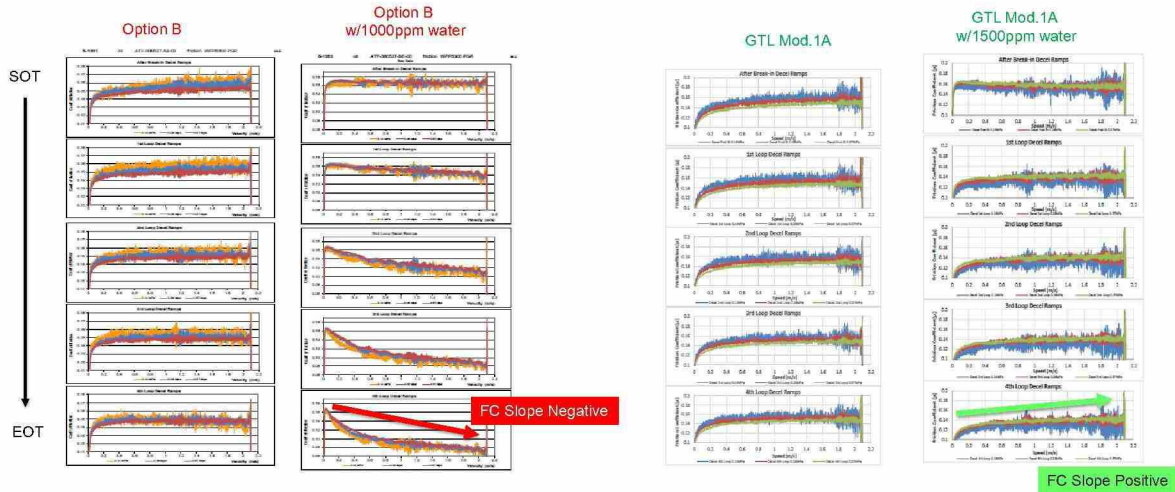


No water added
1000ppm Water added

Solution: MY20 Implement GTL Mod1a ATF which has positive friction curve slope by design and is impervious to known noises (i.e. water).

Read Across: PRD PRTS 1980184 main learning is 3 Day Wear Test w/ > 1000ppm of water added to VCRL.

GMWEAR Testing – Luk WFP6300



GTL Mod.1A friction gradient unaffected by water contamination at the 1000-1600ppm level after Initial Break-in

212B and Option B friction gradient drastically affected by water contamination at the 1000-1600ppm level

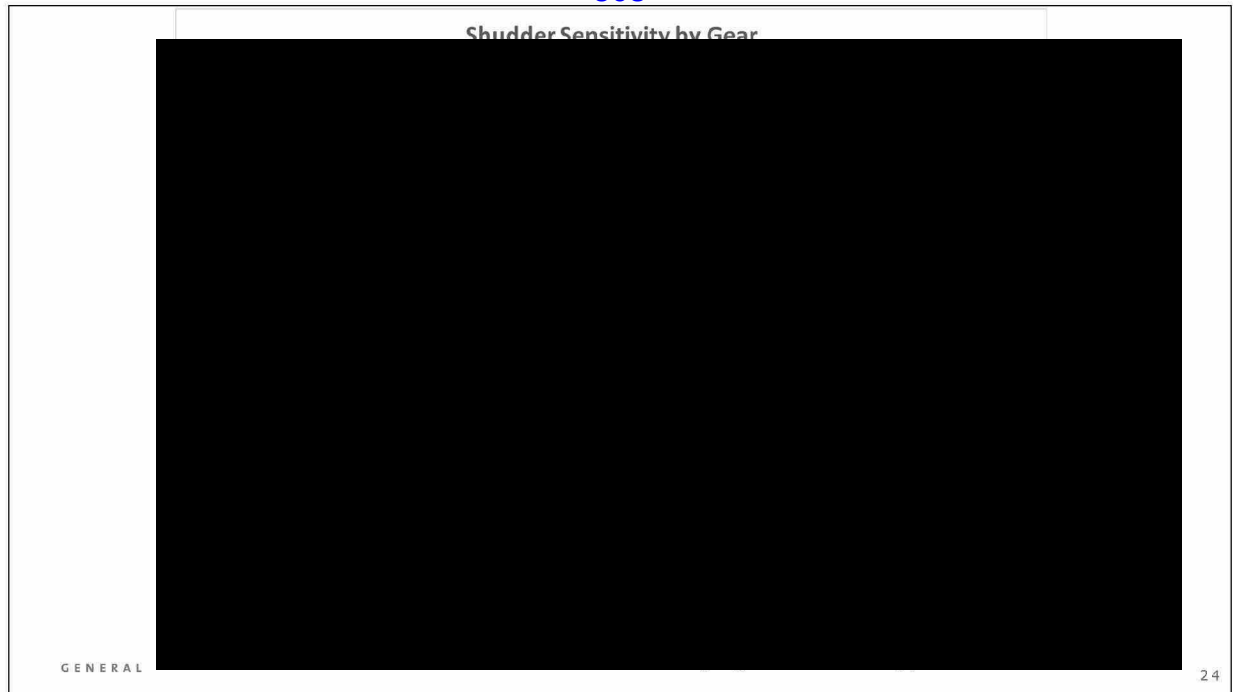
GENERAL MOTORS

Starting Devices Integration

Lessons Learned from Shudder Investigations – 9 Speed

Root Cause:



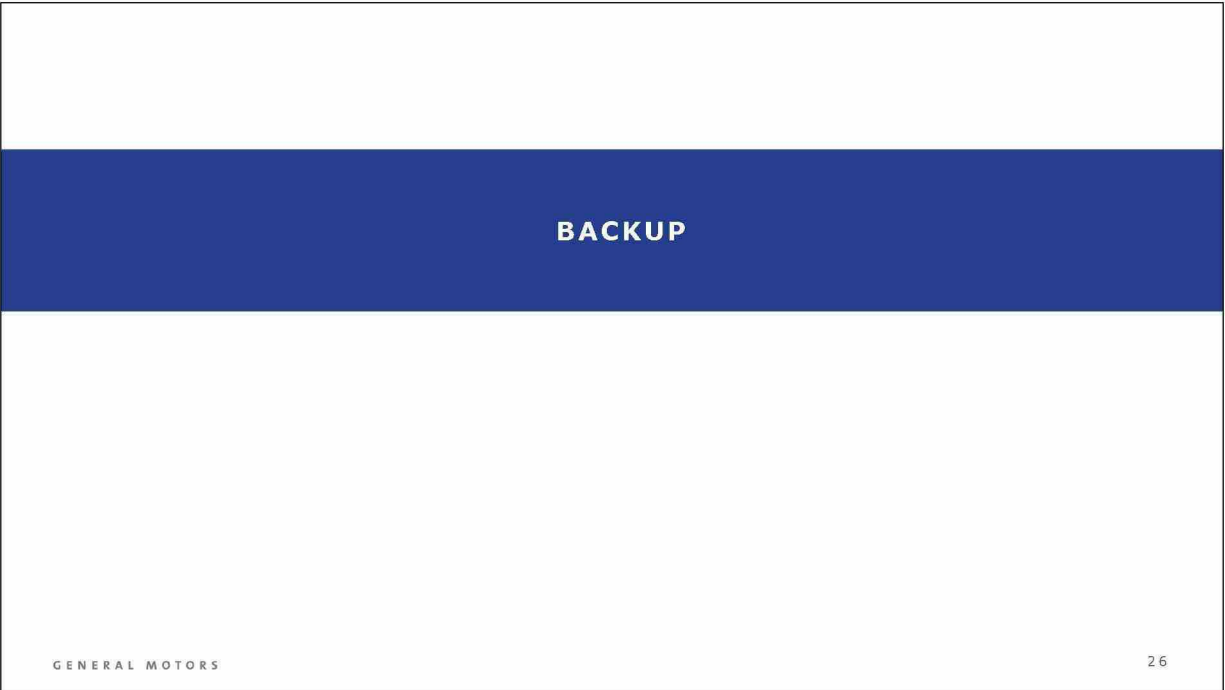


LEGACY PROGRAMS & FUTURE DIRECTIONS



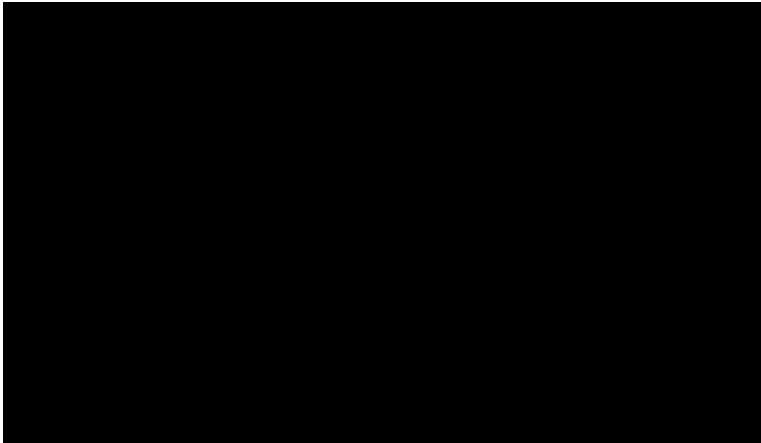
GENERAL MOTORS

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Starting Devices - Confirmation

ADV Toolbox Updates - Shudder Lessons Learned



GENERAL MOTORS

Starting Devices - Confirmation

ADV Toolbox Future Enhancements

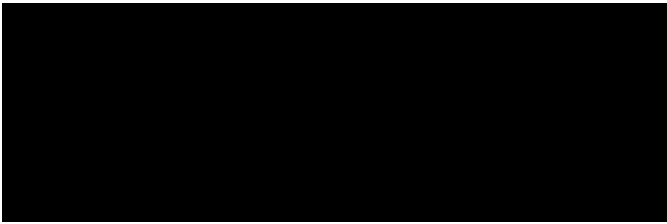


GENERAL MOTORS

Starting Devices Integration

Lessons Learned from Shudder Investigations – Aisin AW8 Benchmarking Prelim. Report

Preliminary Report:



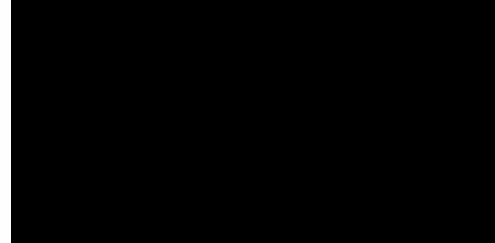
2018 C1UL LGX V6 Aisin AF50-8 (RPR1)
20% Blocked Pedal Unshift



Next Steps:



STEADY-STATE TCC OPERATION STRATEGY



GENERAL MOTORS

FRICTION INDUCED VIBRATION (PHENOMENON)

- When the force needed to start the motion is higher than what is needed to maintain sliding.
- For a moving system the applied force increases until it is higher than the maximum static friction force.

1.) Static Friction sufficient to encounter spring force

2.) Dynamic Friction insufficient to encounter spring force therefore block slides to the left.

3.) The relative motion between the block and belt decreases and therefore static friction is achieved balancing the forces once again.

4.) The process repeats itself and is thus the oscillatory velocity.

This leads to continuous speeding up (slip) and slowing down (sticking), or stick slip vibration.

C represents damping in the driveline.

GENERAL MOTORS

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Phenomenon is when the force needed to start the motion is higher than what is needed to maintain sliding.

For a moving system the applied force increases until it is higher than the maximum static friction force.

#1 - The static friction is sufficient to encounter the spring force and thus the force balance is equal.

#2 - The dynamic friction force is insufficient to encounter the spring force, therefore the block slides to the left.

#3 - The relative motion between the block and belt decreases and therefore static friction is achieved balancing the forces once again.

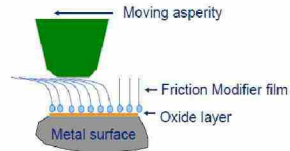
#4 - The process repeats itself and is thus the oscillatory velocity. This leads to continuous speeding up (slip) and down (sticking), or stick slip vibration. Example to the right.

ATF FRICTION MODIFIERS

- Friction Modifiers (FMs) are surfactants that work by adsorbing to metal (or paper) surfaces
 - Create a “push carpet-like” layer to keep surfaces apart, minimizing asperity contacts
 - Friction modifiers benefit from two types of forces:
 - Adhesion – attraction to the surface
 - Cohesion – interactions with adjacent molecules due to “packing”

- Molecules are designed to:

- Adhere to metal and/or friction material surfaces
- “Stand” upright into bulk oil

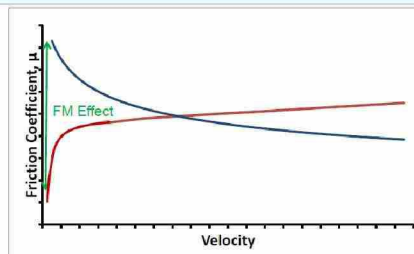


Two broad categories

- ▲ Compounds that reduce the coefficient of friction
 - Classic friction modifiers
- ▲ Compounds that increase the coefficient of friction
 - Mainly detergents

Classic FMs

- ▲ Non-polar hydrophobic tail to form interacting layers
- ▲ Polar head group for interacting with the metal surface



- A properly formulated (additized) fluid will have a positive friction versus velocity relationship over a wide range of speeds and across a range of temperatures.
- Of course as these friction modifiers are destroyed or “out competed” the low speed friction will rise

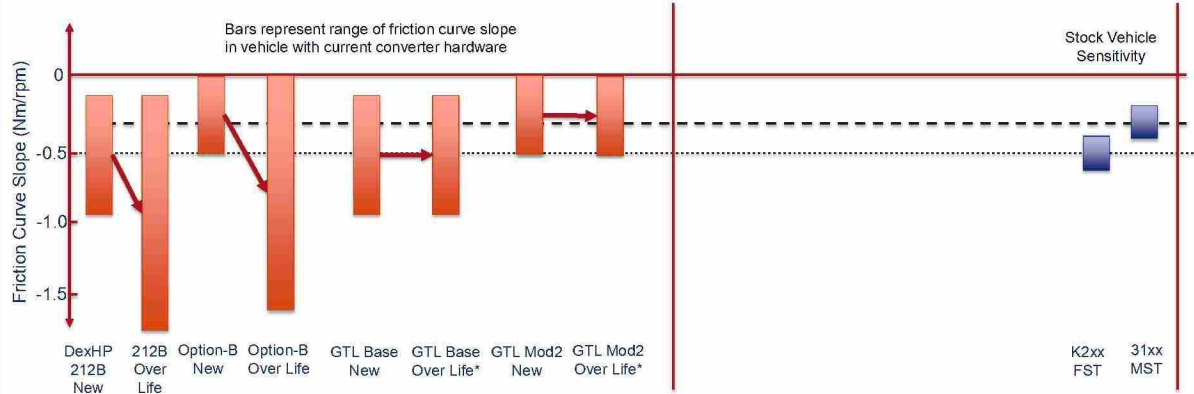
GENERAL MOTORS

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8L90 ATF FRICTION COMPARISON

In-vehicle measured friction curves.

System friction performance must stay above vehicle sensitivity line to prevent shudder

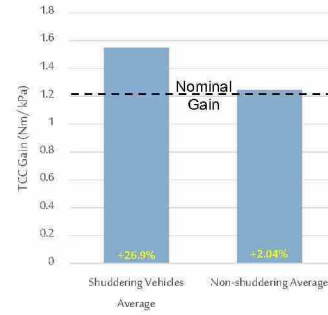
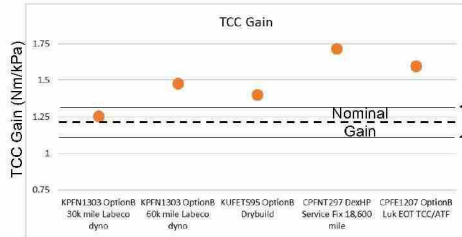
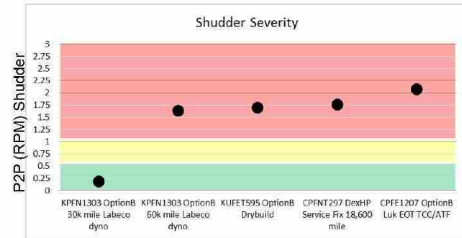


GENERAL MOTORS

*Based on projection using bench durability data and vehicle/bench water doping.

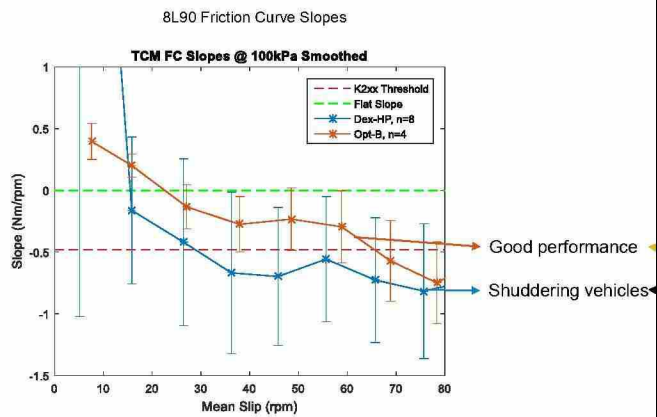
Note T1xx threshold TBD, next in simulation queue.

TCC Gain Observations



Gain indicates health of system.

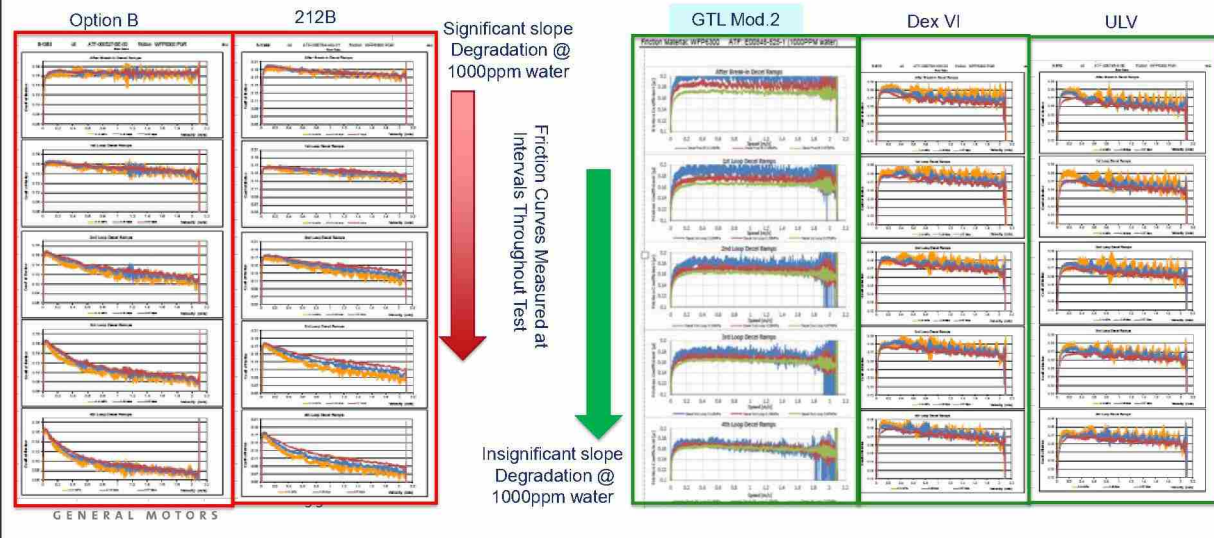
Friction Curve Observations



Friction parameters indicate shudder propensity and control performance.

ATF CONTAMINATION ON SAE #2 3 DAY WEAR TEST

- Original 8 Speed ATF (212B) & Option B are highly sensitive to water.
- Seen in data below, as well as vehicle testing, and ATF field samples measuring water.

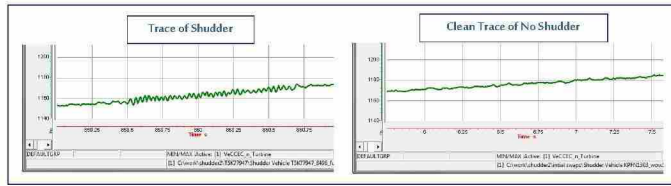
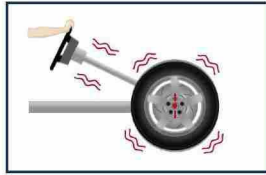


WARRANTY PROBLEMS

GENERAL MOTORS

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A RECURRING PROBLEM



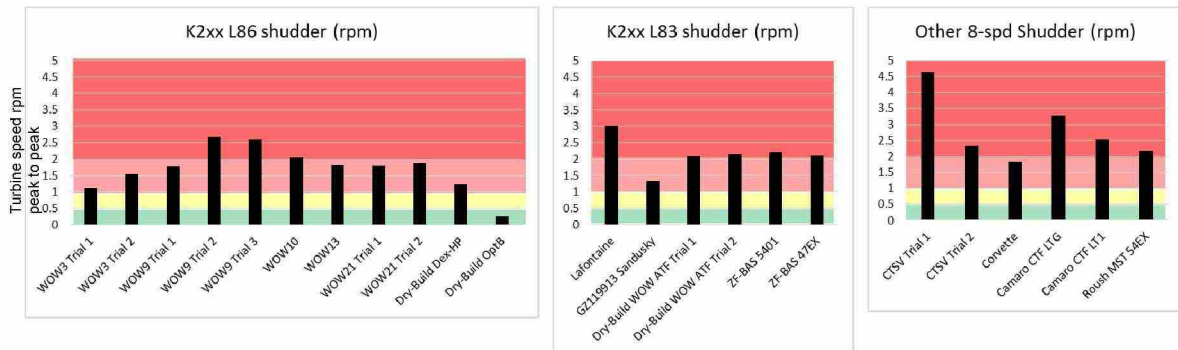
- 8L45/90 RWD
 - Y1XX MY14 TCC driveline shudder; bad friction curve low driveline damping
 - K2XX MY15 TCC damper shudder / bad control; clutch glazing due to high energy
 - MY14 – Current, All Applications: TCC driveline/damper shudder & TCC Control issues: ATF humidity sensitivity

TCC (shudder/control) is the fuse for many types of system integration failures.

GENERAL MOTORS

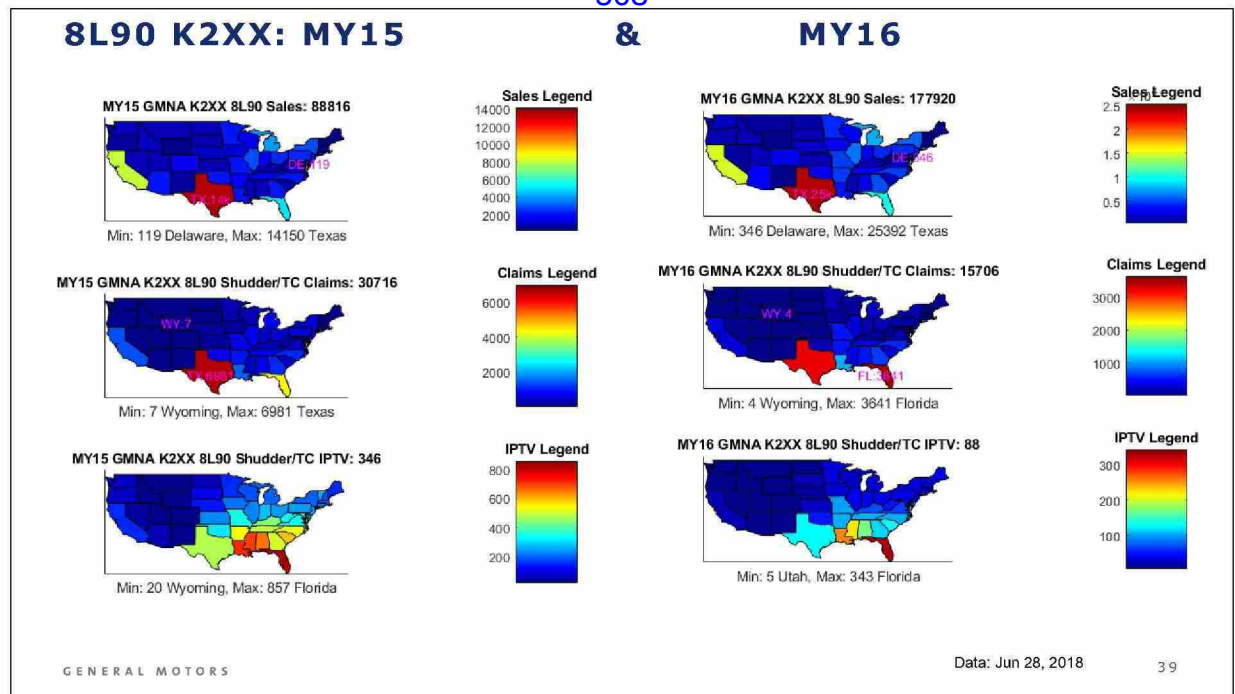
Clearly explain phenomenon
Significance of warranty cost

SHUDDER SEVERITY COMPARISON



GENERAL MOTORS

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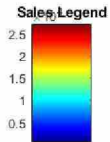
8L90 K2XX: MY17

& 8L45 31XX: MY17

MY17 GMNA K2XX 8L90 Sales: 199434



Min: 354 Rhode Island, Max: 27218 Texas



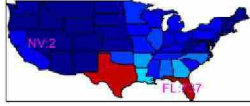
MY17 GMNA MST 8L45 Sales: 83933



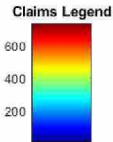
Min: 145 Wyoming, Max: 8775 California



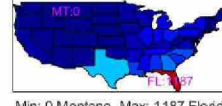
MY17 GMNA K2XX 8L90 Shudder/TC Claims: 4501



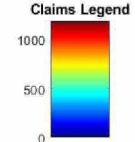
Min: 2 Nevada, Max: 737 Florida



MY17 GMNA MST 8L45 Shudder/TC Claims: 4677



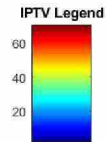
Min: 0 Montana, Max: 1187 Florida



MY17 GMNA K2XX 8L90 Shudder/TC IPTV: 23



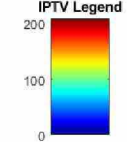
Min: 1 Utah, Max: 70 Florida



MY17 GMNA MST 8L45 Shudder/TC IPTV: 56



Min: 0 Montana, Max: 209 Florida



GENERAL MOTORS

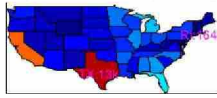
Data: Jun 28, 2018

40

8L90 K2XX: MY18

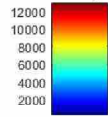
& 8L45 31XX: MY18

MY18 GMNA K2XX 8L90 Sales: 106599



Min: 164 Rhode Island, Max: 12972 Texas

Sales Legend

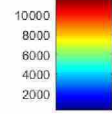


MY18 GMNA MST 8L45 Sales: 122072

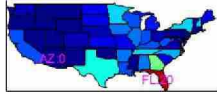


Min: 223 Wyoming, Max: 11696 California

Sales Legend

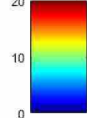


MY18 GMNA K2XX 8L90 Shudder/TC Claims: 143

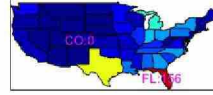


Min: 0 Arizona, Max: 20 Florida

Claims Legend

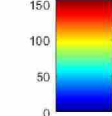


MY18 GMNA MST 8L45 Shudder/TC Claims: 1033



Min: 0 Colorado, Max: 156 Florida

Claims Legend

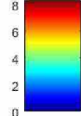


MY18 GMNA K2XX 8L90 Shudder/TC IPTV: 1



Min: 0 Arizona, Max: 8 New Hampshire

IPTV Legend

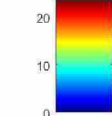


MY18 GMNA MST 8L45 Shudder/TC IPTV: 8



Min: 0 Colorado, Max: 24 Florida

IPTV Legend



GENERAL MOTORS

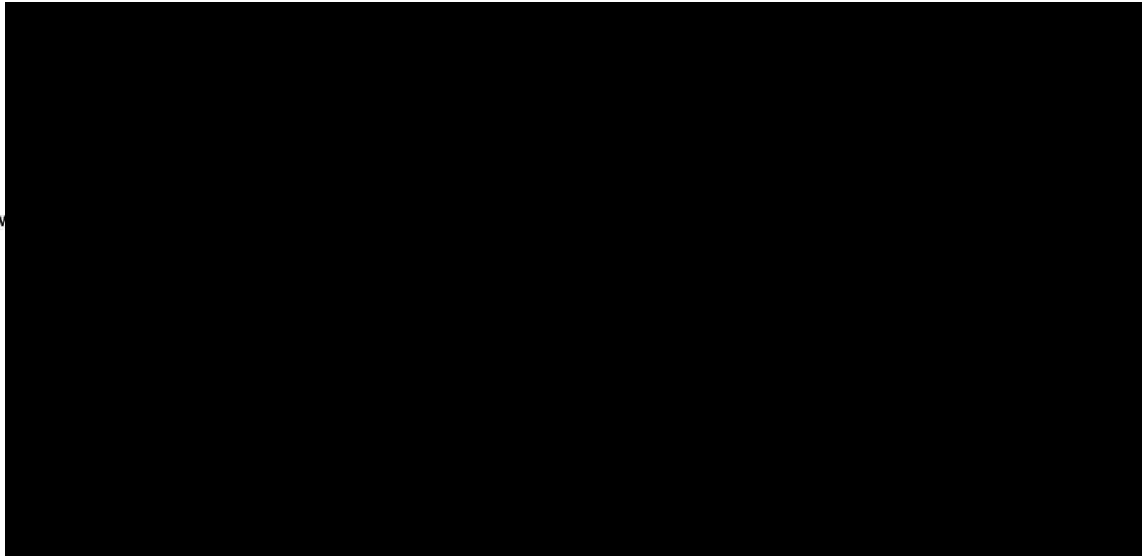
Data: Jun 28, 2018

41

6L45/50 CARS: MY12

&

MY13

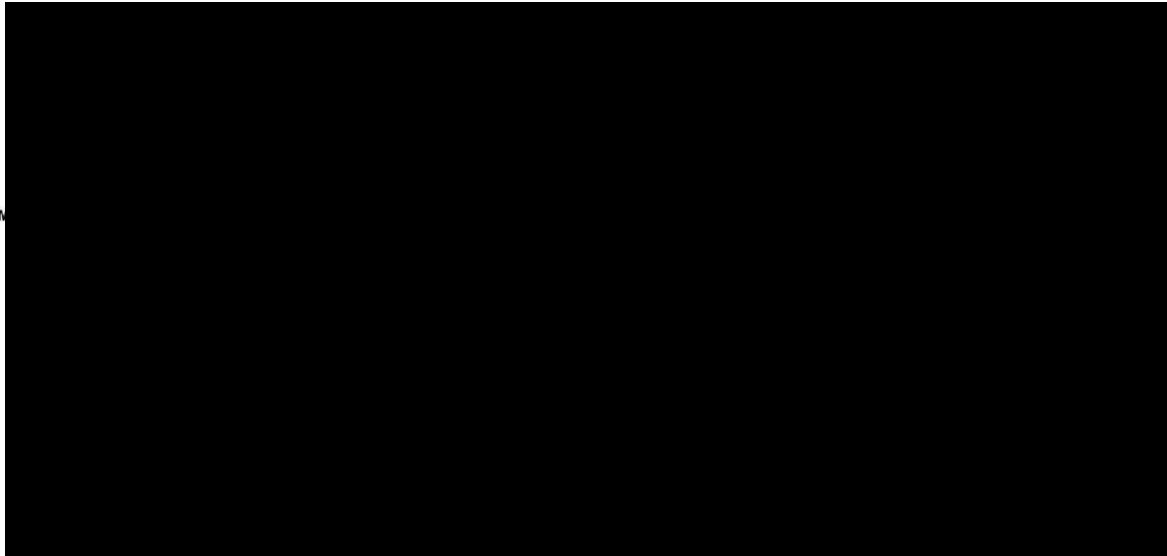


GENERAL MOTORS

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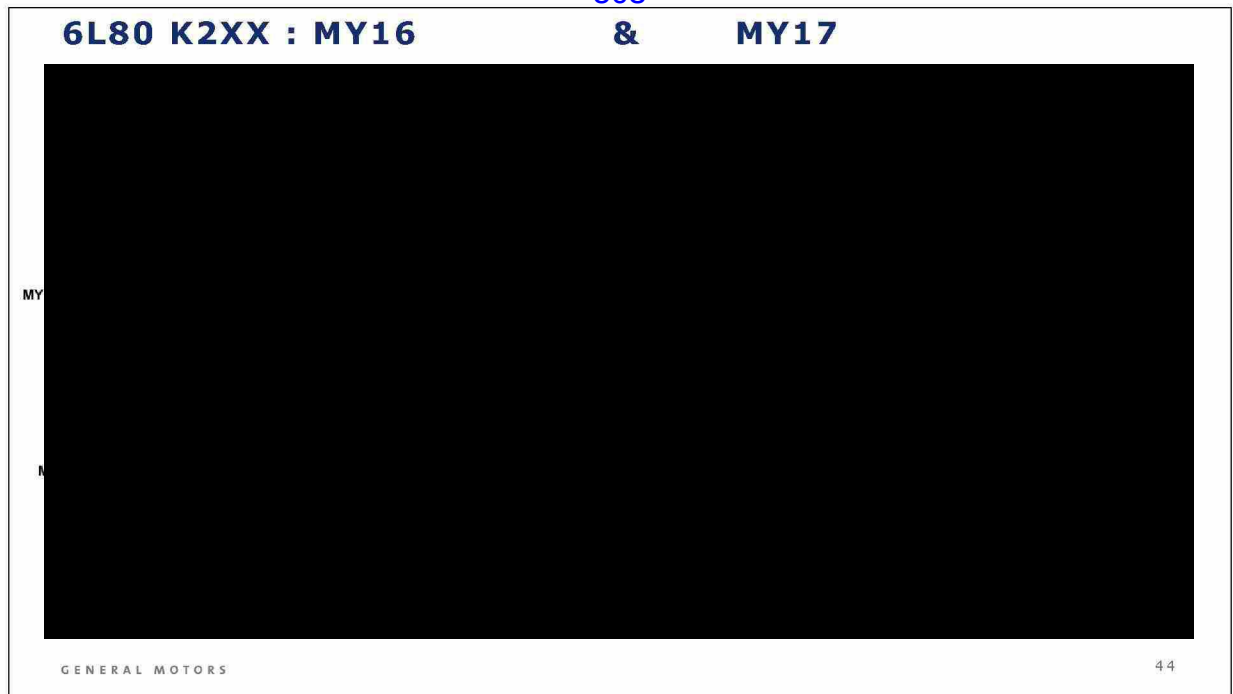
6L45/50 CARS: MY14

& 6L80 K2XX: MY15

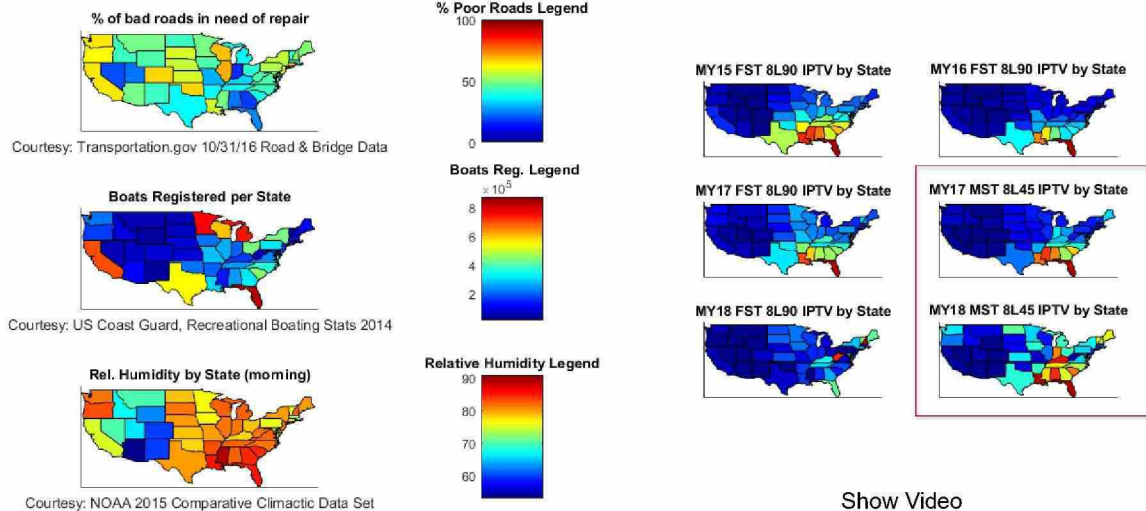


GENERAL MOTORS

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TREND COMPARISON VERSUS 8RWD SHUDDER IPTV



GENERAL MOTORS

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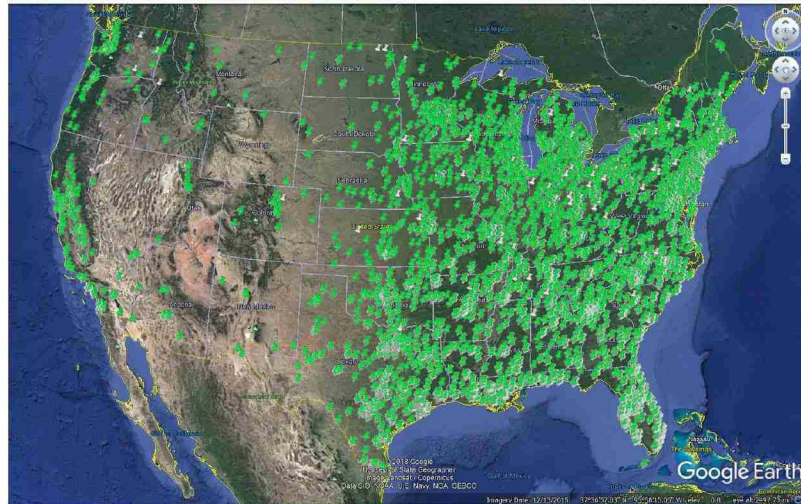
DEX-HP ORIG FORMULATION SHUDDER CLAIMS



8L45



8L90



GENERAL MOTORS

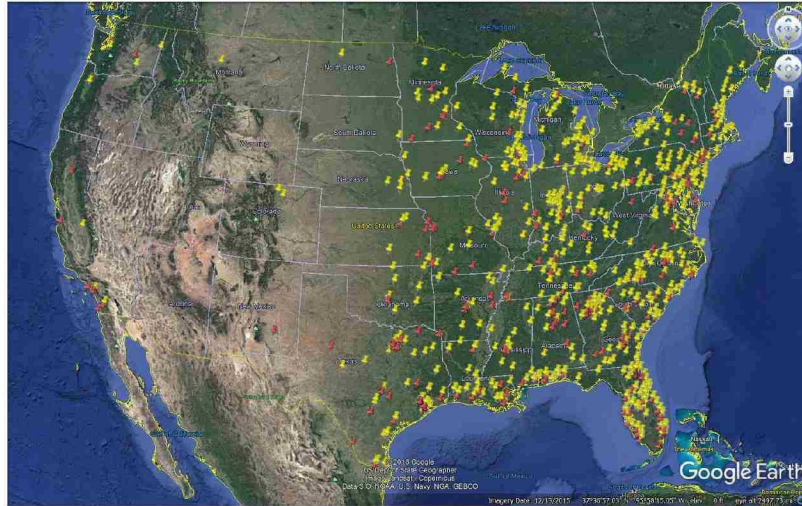
Data: Jan 28, 2018

46

OPTION-B POST-BREAKPOINT SHUDDER CLAIMS

 8L45

 8L90



GENERAL MOTORS

Data: Jan 28, 2018

47

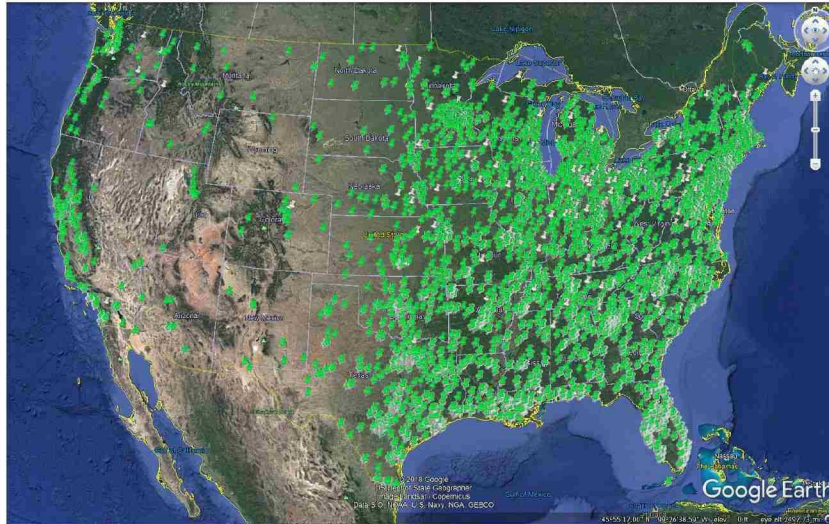
INITIAL SHUDDER CLAIMS AS OF JAN 28, 2018



8L45



8L90



GENERAL MOTORS

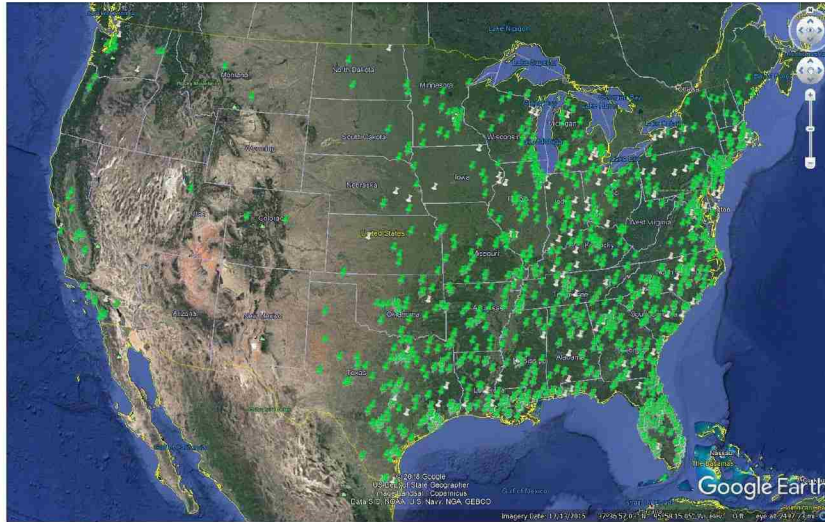
Data: Jan 28, 2018

48

REPEAT SHUDDER CLAIMS AS OF JAN 28, 2018

 8L45

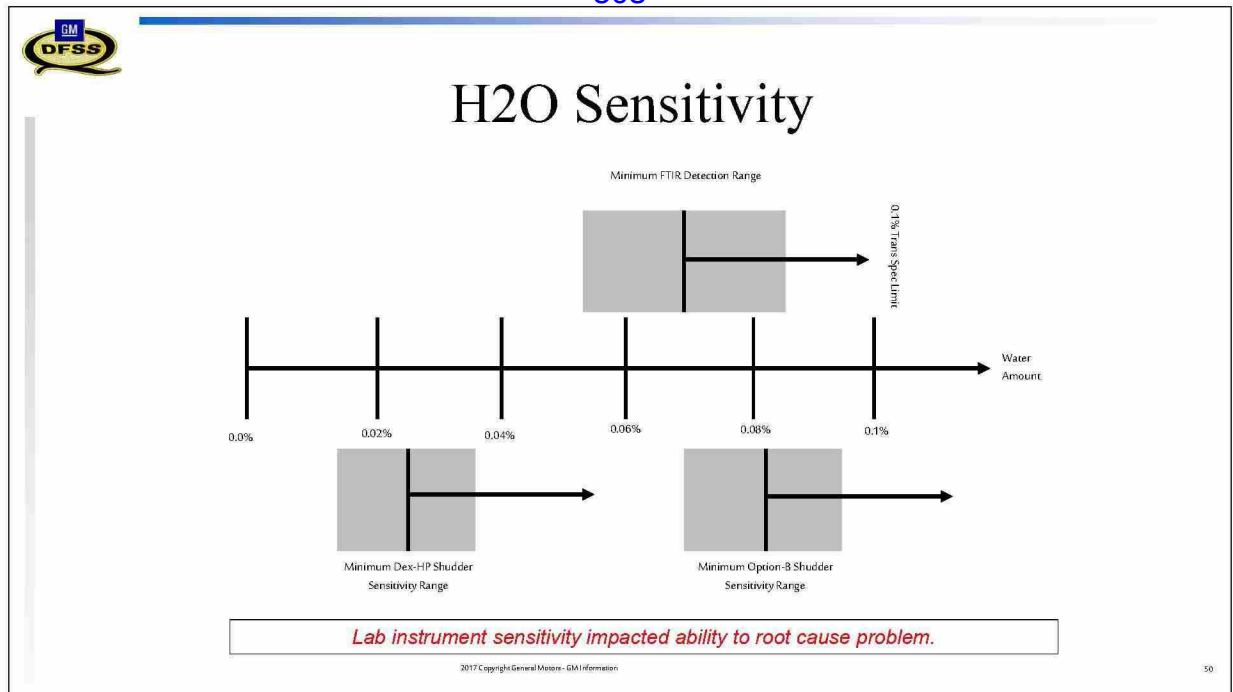
 8L90



GENERAL MOTORS

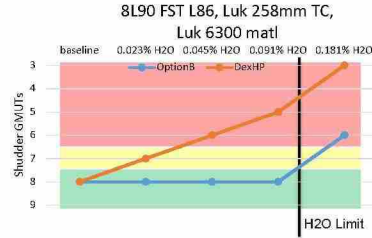
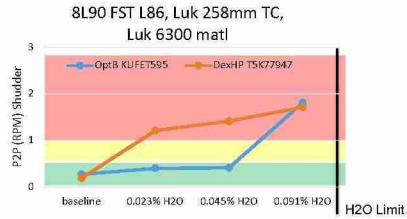
Data: Jan 28, 2018

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Water Sensitivity 8RWD

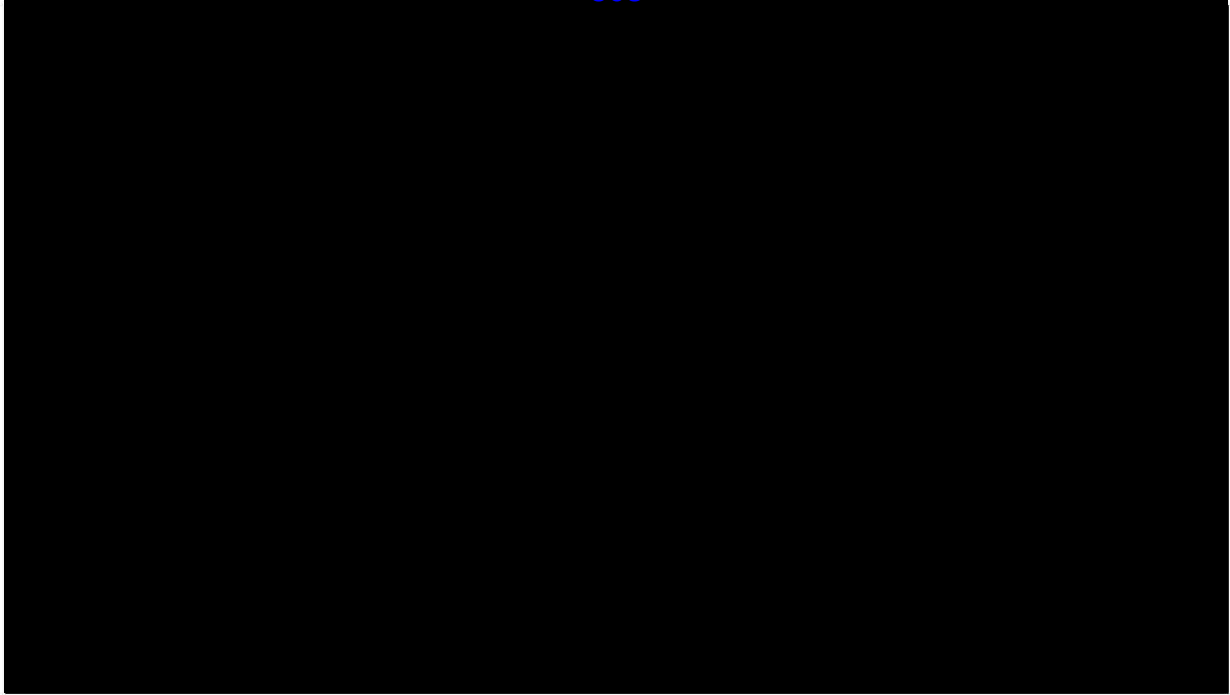


Specification Limit = 0.1% H2O
8RWD Dex-HP Fails shudder test at less than 1/5 water limit.
Option-B Fails shudder test at 1/4 of water limit.

	Vehicle/Trans/Converter #1				Vehicle/Trans/Converter #2				
Water Added	0mL	+2mL 2mL	+2mL 4mL	+4mL 8mL	0mL	+2mL 2mL	+2mL 4mL	+4mL 8mL	+8mL 16mL
Mass %	0 Baseline	0.023% H2O	0.045% H2O	0.091% H2O	0 Baseline	0.023% H2O	0.045% H2O	0.091% H2O	0.181% H2O
Meas. Content Dexron HP	<0.01%	<0.01%	0.01%	0.02%	<0.01%	<0.01%	0.01%	0.02%	0.05%
Meas. Content Option B	0.02%	0.02%	0.02%	0.04%	0.02%	0.03%	0.03%	0.05%	0.06%

Note: Meas. Water Content Sample pulled after shudder evaluation for each step.

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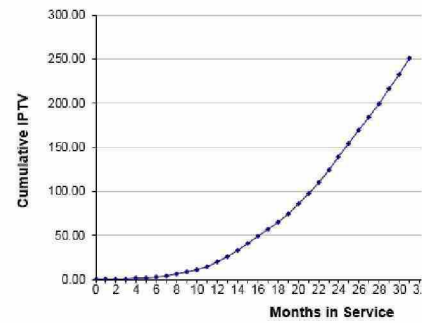


Shudder warranty

Difficult for field technician to diagnose:

Difficult for field technician to diagnose:					3562	35,965/31	148,119	451,105	882,87	129,18	441,389	750,129
					PTV							
No	Labor Code	CSI	Labor Description	Fat	Cost (Dollar)	12 Mts	24 Mts	36 Mts	12 Mts	24 Mts	36 Mts	
1	2610175	0	Transmission Control Module Reprogramming in 8-SPS	3719		82.21	117.90	161.60	7.26	7.39	9.42	
2	8480518	0	Replace Torque Converter Filter and Flush Lines	5387		6.48	87.84	139.40	7.28	115.78	189.79	
3	8484970	0	Torque Converter Replacement	4095		13.95	51.54	99.95	16.15	61.45	121.64	
4	1084670	0	Transmission Hydraulic Control	4222		27.73	47.25	400.17	65.08	103.41	198.52	
5	8480119	0	Transmission Service Pad Leaks	4923		13.15	25.89	211.18	3.65	5.13	13.30	
6	8479229	0	Automatic Transmission - Customer Concern Not Duplicated (O)	3222		15.54	77.43	40.99	3.65	1.23	1.72	
7	8485020	0	Stator Shaft Support Replacement	1761		9.24	22.92	32.87	3.63	32.68	29.88	
8	2819155	0	Control Solenoid Valve and Transmission Control Module Assen	845		4.18	10.39	15.66	3.30	3.73	1.65	
9	8483690	0	Control Valve Body Replacement	494		1.17	5.89	11.36	1.09	0.94	15.91	
10	8481980	0	Transmission Control Wiring Harness Replacement	471		0.18	5.78	10.37	0.31	2.45	5.68	
11	8481430	0	Transmission Control Module Replacement	248		1.41	2.92	3.95	0.28	0.73	0.95	
12	8482930	0	Transmission Fluid Pan Replacement	210		1.18	2.46	3.45	0.66	1.13	1.55	
13	8483670	0	Automatic Transmission Wiring Harness Replacement	177		0.18	1.98	3.41	0.20	1.12	1.65	
14	8485010	0	Reaction Carrier Overhaul	185		0.67	1.11	1.63	0.77	1.59	2.68	
15	8483662	0	2-3-4-5-8 and 6-6-8-7-8 Reverse Clutch Assembly Overhaul	67		0.69	0.83	1.44	0.14	1.89	3.10	
16	8485589	0	Drive Lcam Procedure	32		0.61	0.52	1.02	0.00	0.11	0.18	
17	8484270	0	Torque Converter Fluid Seal Replacement	35		0.15	0.47	0.79	0.10	0.41	0.65	
18	8480170	0	Health and Learn Notice for Transmission Shale and/or Shudder In	22		0.18	0.41	0.97	0.07	0.34	0.91	
19	8482350	0	Manual Shift Shaft Position Switch Replacement	22		0.14	0.23	0.41	0.07	0.14	0.20	
20	1856312	0	1-3-5-7 Clutch Assembly Overhaul	23		0.10	0.25	0.41	0.09	0.31	0.67	
21	8482190	0	Transmission Control Cover Replacement	27		0.15	0.20	0.40	0.13	0.09	0.63	
22	8482050	0	Transmission Fluid Filter Tube Plug Replacement	19		0.10	0.20	0.27	0.01	0.02	0.63	
23	8486440	0	1-2-3-4 Reverse Clutch and Piston Replacement	16		0.62	0.18	0.27	0.03	0.34	0.68	
24	8482110	0	Input and Output Speed Sensor Replacement	17		0.03	0.22	0.24	0.02	0.10	0.11	
25	8486360	0	1-2-7-8 Reverse Clutch and Piston Replacement	11		0.01	0.17	0.21	0.03	0.34	0.43	

cost in 8-spd shudder warranty



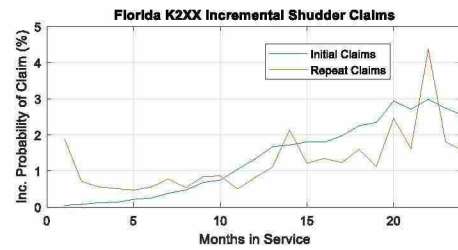
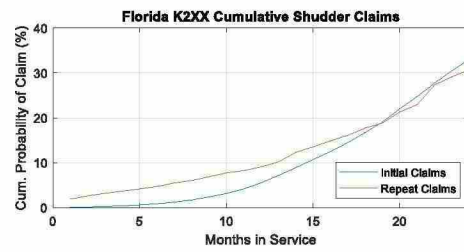
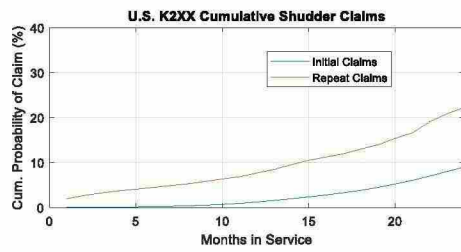
Engineering based on technician diagnosed warranty is difficult until problem is LARGE.

GM Confidential

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FLORIDA INITIAL VS REPEAT CLAIM STUDY



GENERAL MOTORS

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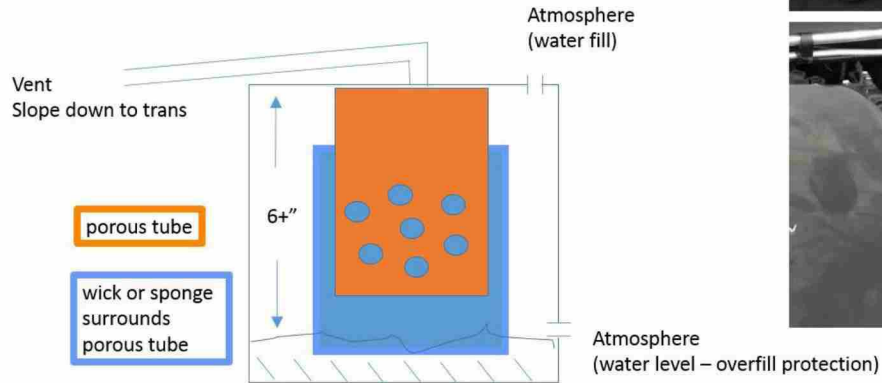
Humidity Vehicle Demonstration

High humidity bottle – SPHET244

Day 1 - Installed bottle

Sump temp cycles: ~qty 10 (80C to 40C) & qty 6 cyc (50C to 15C)

Day 6 - TCC shudder observed



POTENTIAL SOLUTIONS TO HUMIDITY INGESTION

Transmission Vents are Open Air Pressure Equalization Systems – Resulting in PPM contaminants Resolution for this condition can be accomplished in four separate, challenging ways

- Separation, Filtration, Elimination, Mitigation

Contaminate separation – Provide a condensation chamber (dehumidifier)

- **No known uses on Transmissions**
- Concept could be Heat Exchanger with a drain and vent feeds

Filtration of air contamination

- Filtration (Expendable)
 - **Desiccant - Silica gel filters – must be serviced** (3-12 months based on sizing)
 - <https://www.descase.com/breathers/standard-desiccant-breather#features>
- Filtration (Permanent) - **Permits Free Air Exchange** (designed to keep out liquids not gasses)
 - PTFE Membranes – aka. Hydrophobic filters (Gortex) – **Sizing issues** approx. **8"x9" Sheet**



Elimination via a sealed system

- Baffles / balloons / bladders – **Sizing issues** approx. **7.4 liters**

Mitigation venting alternatives

- **Pressurized transmission system (ROI – P044743)**
- Limit air inhalation exchange until after operation (key off)
- Pressurized Operation - Vacuum Static condition on transmission
- **New Failure Modes to Consider** (*rapid pressure blow off* (ROI Pending))

Temp °C	Oil Density (kg/m³)	Total Oil Volume (liters)	Oil Contamination Separation from 20°C (liters)	Oil Contamination Separation from 25°C (liters)	Oil Contamination Separation from 30°C (liters)	Transmission Interior Volume (liters)	Air Inside Transmission with open vent (liters)	Air - Sealed (liters)	Air - Sealed (liters)	Sealed Pressure (atm)
-30	0.8752	10.26	0.04	0.04	0.04	25.1	25.1	0.01	0.01	1.01
-25	0.8802	10.30	0.05	0.05	0.05	25.1	25.1	0.01	0.01	1.01
-20	0.8852	10.34	0.06	0.06	0.06	25.1	25.1	0.01	0.01	1.01
-15	0.8902	10.38	0.07	0.07	0.07	25.1	25.1	0.01	0.01	1.01
-10	0.8952	10.42	0.08	0.08	0.08	25.1	25.1	0.01	0.01	1.01
-5	0.9002	10.46	0.09	0.09	0.09	25.1	25.1	0.01	0.01	1.01
0	0.9052	10.50	0.10	0.10	0.10	25.1	25.1	0.01	0.01	1.01
5	0.9102	10.54	0.11	0.11	0.11	25.1	25.1	0.01	0.01	1.01
10	0.9152	10.58	0.12	0.12	0.12	25.1	25.1	0.01	0.01	1.01
15	0.9202	10.62	0.13	0.13	0.13	25.1	25.1	0.01	0.01	1.01
20	0.9252	10.66	0.14	0.14	0.14	25.1	25.1	0.01	0.01	1.01

Kenneth C. Tesner
Technical Specialist – GPS Trans Venting
734.320.8276

GENERAL MOTORS

EXHIBIT 9



Deposition of:
Joseph James Page

September 23, 2021

In the Matter of:
**Won, Wesley et al. v. General Motors,
LLC**

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

WESLEY WON, et al.
individually and on behalf
of all others similarly
situated

Plaintiffs

vs.

Civil Action No. 2:19-cv-11044

Hon. David M. Lawson

Mag. Judge David R. Grand

GENERAL MOTORS, LLC

Defendant

The CONFIDENTIAL Videotaped
Videoconferenced Deposition of JOSEPH JAMES PAGE
Taken virtually via Zoom in Michigan
Commencing at 9:00 a.m.
Thursday, September 23, 2021
Before Mary Jo Power, CSR-1404, RPR, RMR, CRR

1 APPEARANCES:

2 (All parties attended via Zoom videoconference.)

3
4 STEVEN CALAMUSA

5 Gordon & Partners, P.A.

6 4114 Northlake Boulevard

7 Palm Beach Gardens, Florida 33410

8 561.799.5070

9 scalamusa@fortheinjured.com

10 Appearing on behalf of the Plaintiffs

11
12 KARINA G. PUTTIEVA

13 DOUGLAS J. McNAMARA (Joined proceedings at 5:08 p.m.)

14 Cohen Milstein, Sellers & Toll, PLLC

15 1100 New York Avenue NW East Tower

16 5th Floor

17 Washington, DC 20005

18 202.408.4600

19 kputtieva@cohenmilstein.com

20 dmcnamara@cohenmilstein.com

21 Appearing on behalf of the Plaintiffs

22

23

24

25

1 JEREMY ROUX

2 Kirkland & Ellis LLP

3 300 North LaSalle Drive

4 Chicago, Illinois 60654

5 312.862.2000

6 jeremy.roux@kirkland.com

7 Appearing on behalf of the Defendant

8
9 ALSO PRESENT:

10 Bob Brash - concierge

11 Jamie Galucci - paralegal (Joined proceedings at 9:02 a.m.)

12 Peter Hudson - video technician

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1 that green box, 8RWD Gen 2 addresses these customer-
2 facing issues.

3 BY MR. CALAMUSA:

4 Q. Okay. And what are the customer-facing issues that
5 you see on that document?

6 A. I see harsh garage shifts, first -- first-shift-of-
7 the-day, and rough coast downs.

8 Q. All right. Are you familiar with the -- these issues
9 that are customer-facing issues that are identified in
10 this document relative to the 8-speed transmission?

11 A. I am familiar with the issues.

12 Q. Okay. And --

13 A. At -- at least on the high level, not the deep
14 details, but yes.

15 Q. Okay. And harsh garage shifts, when was the first
16 time you became aware of harsh garage shifts relative
17 to the 8-speed transmission Gen 1?

18 A. I mean, in the pre-production phase we -- we had harsh
19 garage shifts. I mean, that's when I first -- you
20 know, when -- when -- when that first kind of -- kind
21 of came to light during the development phase.

22 Q. Okay. So that's 2013, 2014?

23 A. Yeah, somewhere around there. Yep.

24 Q. All right. And when did you first become aware of the
25 first-shift-of-the-day issue, where it says in here,

1 Pulling out of my driveway, I feel a bump on the first
2 shift at five miles an hour.

3 When did you first become aware of that?

4 MR. ROUX: Objection: form.

5 THE WITNESS: I -- I -- I can't recall.

6 BY MR. CALAMUSA:

7 Q. Okay. You do know that that is an issue with the Gen
8 1 8-speed transmission, correct?

9 A. I mean, I -- I -- I do know; I'm seeing it here, and I
10 -- I've heard that, but I don't remember when I was
11 first made aware of -- of the first-shift-of-the-day
12 concerns.

13 Q. But it was while you were working on the 8-speed
14 program?

15 MR. ROUX: Objection: form.

16 THE WITNESS: I don't remember about
17 first-shift-of-the-day.

18 BY MR. CALAMUSA:

19 Q. Okay. You're not sure?

20 A. I'm not sure. I can't remember.

21 Q. Okay. And what about the roas -- the -- the rough
22 coast down, coming to a stop it feels like I was
23 rear-ended. When did you first become aware of that?

24 MR. ROUX: Objection: form.

25 THE WITNESS: I mean, we had rough coast

1 downs pre-production, which is why there is a
2 development phase there. I believe all the work we
3 did resolved these issues, and they were, you know,
4 closed out before we went into production.

5 BY MR. CALAMUSA:

6 Q. Okay. Well, I guess my -- my point -- my point of it
7 is this, is that you stopped working for the
8 calibration department in November of 20 -- November
9 of 2014 relatively to the 8-speed transmission; is
10 that right?

11 A. That's right.

12 Q. Okay. You were not in control of the hardware that
13 was selected for these vehicles, correct?

14 A. I was not.

15 Q. Okay. So when you're calibrating these vehicles for
16 production that you are locked in with the hardware
17 that has been approved for these -- these
18 transmissions.

19 A. As I've said earlier, the hardware comes with those
20 first vehicles. During the couple years of
21 development, there is an opportunity to change
22 hardware if -- you know, if the need arises.

23 Q. Okay. Now, would you agree with me that it appears,
24 based upon this GM document that's a April of 2021
25 document, that the issues that you believe were closed

1 out back in 2014 are still issues that are present in
2 the Gen 1 transmissions, based upon this document?

3 MR. ROUX: Objection: form.

4 THE WITNESS: Yeah, as I mentioned, the
5 harsh garage shifts and rough coast downs, I do
6 remember those from pre-production. I believed that
7 those were closed out.

8 I can't recall when I first heard of the
9 first-shift-of-the-day concern that's shown here.

10 BY MR. CALAMUSA:

11 Q. Well, what I'm saying is that, when you say they were
12 closed out, when do you think they were closed out?

13 A. Before we went into production we got everything to a
14 certain level agreed to by the leadership team,
15 evaluated in -- in vehicles. So to -- to our
16 knowledge, you know, maybe 2000 and -- middle/end of
17 the summer of 2014 we believed that these items
18 were -- were addressed and behind us.

19 Q. Okay. So just -- I want to kind of draw the
20 distinction between these items are fixed versus
21 closed out.

22 So you think -- there's -- there's a --
23 there's a distinction that I just want to draw here is
24 that it appears, unless GM is drawn -- you know, is --
25 is making things up in this 2021 document, that the

1 8-speed transmission Gen 1 still has problems with
2 harsh garage shifts, first shifts of the day, and
3 rough coast downs, where it feels like -- people feel
4 like they were rear-ended. Would you agree with me
5 that this document from 2021 identifies those issues?

6 MR. ROUX: Objection: form.

7 THE WITNESS: Yeah, I mean, this isn't my
8 document. It -- it -- I mean, I don't recall this
9 document; I don't think I had any part of this because
10 I was off the 8-speed team when this was put together.

11 BY MR. CALAMUSA:

12 Q. Yeah, I -- I appreciate that, but you've been put up
13 for topics as the -- as the corporate representative,
14 so I'm just inquiring about if -- this information
15 which has to do with the development of this
16 transmission, which is this is just a continuation of
17 the 8-speed transmission to Gen 2.

18 So my -- my -- my question is this, is that
19 would you agree with me that you saw some of the
20 issues that are identified here pre-production on the
21 8-speed transmission, and -- would you agree with
22 that, that are identified in this page?

23 MR. ROUX: Objection: form.

24 THE WITNESS: But I do agree that I saw
25 some of these issues pre-production.

1 BY MR. CALAMUSA:

2 Q. Okay. And the issues that you identified
3 pre-production that are listed on Bates stamp 875200
4 are the harsh garage shifts, you identified that
5 during the pre-production phase for the 8L
6 transmission; is that accurate?

7 MR. ROUX: Objection: form.

8 THE WITNESS: That's accurate.

9 BY MR. CALAMUSA:

10 Q. Okay. And also -- also the rough coast downs, that
11 that problem declared itself during the pre-production
12 phase.

13 MR. ROUX: Objection: form.

14 THE WITNESS: That was identified during
15 the development phase of the program.

16 BY MR. CALAMUSA:

17 Q. Okay. Time frame 2013, 2014?

18 A. Correct.

19 Q. Okay. And then what we also have is we have the
20 first-shift-of-the-day. You don't remember exactly
21 when you recall that this issue arose with respect to,
22 you know, people feel a bump on the first shift in the
23 morning at five mile an hour, but you do have
24 knowledge of it prior to stepping into this deposition
25 today.

1 BY MR. CALAMUSA:

2 Q. Okay. Well, what is the highest IPTV target that
3 you've ever seen?

4 A. I don't get into IPTV targets very often for -- for my
5 job. Like I said, I probably saw it on the 8-speed.
6 I don't remember what -- what that number is. I --
7 I'm not sure I'm supposed to speculate. I don't know.
8 Less than ten.

9 Q. So would you agree with me that a IPTV of 104.8 is
10 abnormally high as far as what one would expect from a
11 products performance relative to warranty?

12 MR. ROUX: Objection: form.

13 THE WITNESS: Yeah, I mean, based on this
14 slide that I'm looking at right now, if the [REDACTED]
15 [REDACTED], I would agree that 104.8 is pretty
16 high.

17 BY MR. CALAMUSA:

18 Q. Okay. And so would you agree with me -- and that was
19 my next question. I appreciate that.

20 Would you agree with me that the [REDACTED]
21 [REDACTED]
22 [REDACTED]
23 [REDACTED]

24 MR. ROUX: Objection: form.

25 THE WITNESS: Yeah, can -- can you ask that

1 question one more time?

2 BY MR. CALAMUSA:

3 Q. Sure.

4 If we look at model year 2019 with, says,
5 104.8 IPTV, that that obviously was not GM's goal
6 relative to this transmission.

7 MR. ROUX: Objection: form.

8 THE WITNESS: Yeah, this is talking about
9 Gen 2, and based on the slide, [REDACTED],
10 it's -- it's again not my document, but it says,
11 "[REDACTED]."

12 BY MR. CALAMUSA:

13 Q. Okay. So that would be [REDACTED] -- [REDACTED] people out
14 of [REDACTED] complaining about or having an issue with the
15 transmission, versus a hundred people per thousand
16 having problem with the transmission; is that
17 accurate?

18 A. That's how IPTV is calculated.

19 Q. Right. So the IPTV that is seen in model year 2019 is
20 some -- nearly [REDACTED] times worse than the I [REDACTED]

[REDACTED]

22 MR. ROUX: Objection: form.

23 THE WITNESS: Yeah, I mean, just on the
24 math, [REDACTED], as you said.

25 MR. CALAMUSA: All right. I think we're

1 was involved with.

2 BY MR. CALAMUSA:

3 Q. Okay. All right. So when was the first time that 8L
4 shudder came to your attention, as far as you recall?

5 A. Sometime in the pre-production phase, 2013-ish time
6 frame.

7 Q. Okay. And so -- so during the pre-production phase,
8 it appears that a couple of things are coming to your
9 attention. The shudder issue comes to your attention
10 relative to the 8L transmission, correct?

11 A. That's correct.

12 Q. The harsh coast down come to your attention, the
13 three-one coast down?

14 A. Yeah, harsh coast down not meeting the best-in-segment
15 target, correct.

16 Q. And then the -- the harsh upshift, the one-two
17 upshift, comes to your attention; is that right?

18 A. Yeah. Like I said, a couple times, I'm aware of the
19 one-two upshift issue. I don't remember when I, like,
20 first got familiar with that, if it was pre-production
21 or some other time. I -- I just -- I can't remember
22 on the one-two.

23 Q. Okay. But the garage shift is one that you remember
24 experiencing pre-production?

25 A. Again, that was another one that I remember not

1 STATE OF MICHIGAN)

2 COUNTY OF OAKLAND) ss.


3 I, Mary Jo Power, CSR 1404, in and for the State
4 of Michigan, do hereby certify:

5 That, prior to being examined, the witness named in
6 the foregoing deposition was by me duly sworn to testify the
7 truth, the whole truth and nothing but the truth;

8 That said deposition was taken down by me
9 stenographically at the time and place therein named, and
10 thereafter transcribed via computer-aided transcription
11 under my direction, and the same is a true, correct and
12 complete transcript of said proceedings;

13 Before completion of the deposition, review of the
14 transcript was reserved. If requested, any changes made by
15 the deponent (and provided to the reporter) during the
16 period allowed are appended hereto.

17 I further certify that I am not interested in the
18 event of the action.

19 W.  r, 2021.

21 MARY JO POWER, CSR-1404

22 Certified Shorthand Reporter

23 State of Michigan

24 My commission expires: December 12, 2024

25 Notarized using electronic/remote technology

EXHIBIT 11

Transmission 8 RWD Gen 2 Quality Follow Up

DRAFT

DeAnna Hawker
Global Transmission Planning Manager
5/11/2020

GENERAL MOTORS

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Rev Date:5/7/2020

1

Exhibit

PX 0122

Executive Summary: 10 Speed Customer Quality Status

Decision Requested ☐ Discussion Only ☒

Background:

- 10 speed Gen 1 – MY20 IPTV – 5.3, [REDACTED] Compass – 3.26 PPH
- 10 speed Gen 2 – MY20 IPTV – 19.6, [REDACTED] Compass – 5.3 PPH

• [REDACTED]

Highlights:

[REDACTED]

- [REDACTED]

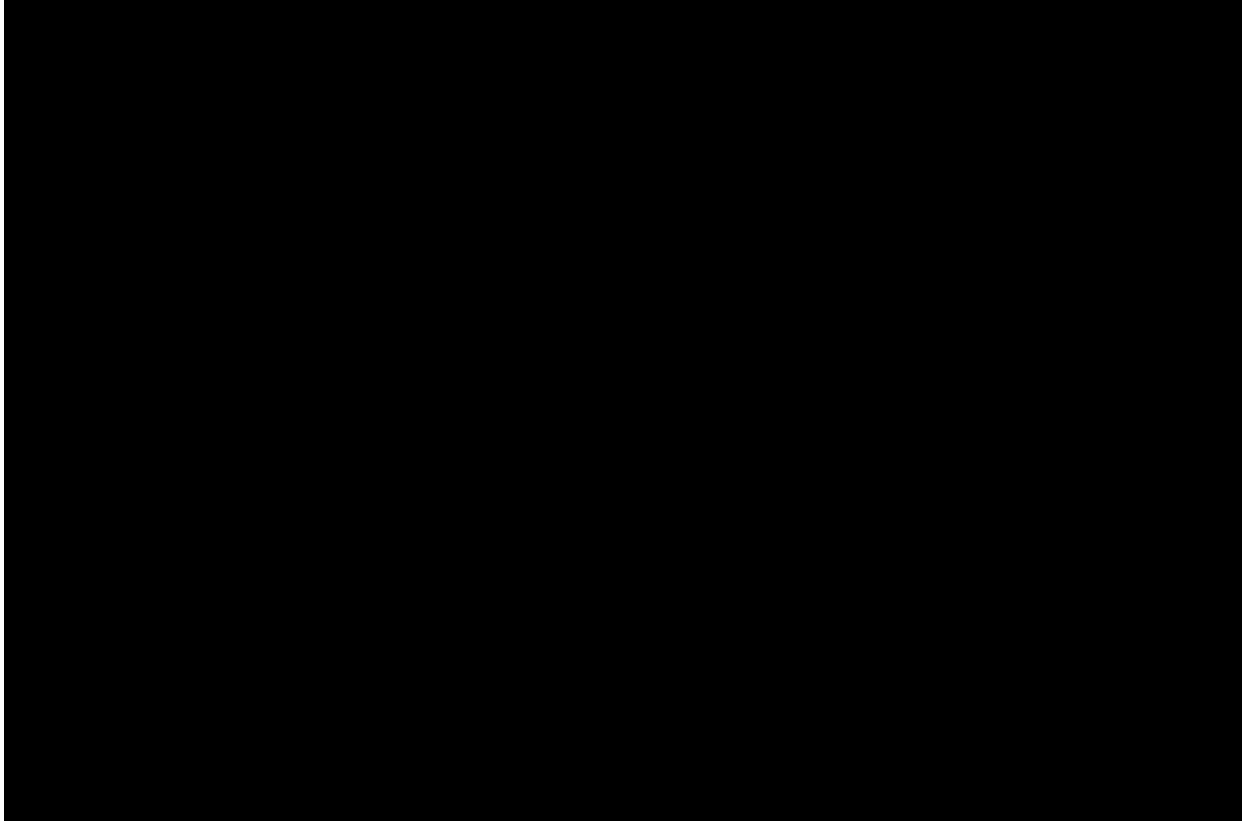
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2

Executive Summary: 8 Speed Gen 2 (AH) Transmission Program

Decision Requested ☐ **Discussion Only** ☒

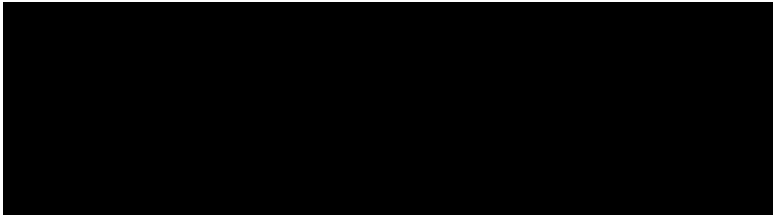


Discussion Record – Transmission Capital Opportunity

Jim Campbell, James Danahy, Jeff Baran, Praveen Kedar, William Stiles

May 4, 2020

Yes No



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BACK UP SLIDES

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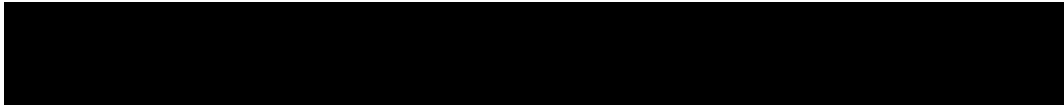
8 RWD Vs 10 RWD Transmission Current Quality Data

MY20 GR10 Gen2 IPTV/CPV - Application/Power cube

	T1 – MQB/L87	T1- MQB/L84	T1 – MQB/LM2	T1- MQB/All
IPTV (12 mis)	15.5	21.6	28.1	20.44
CPV (12mis)	████	████	████	████
Compass PPH	4.3	4.8	8.5	5.34
Sold Volume	37,667	59,052	14,536	111,255

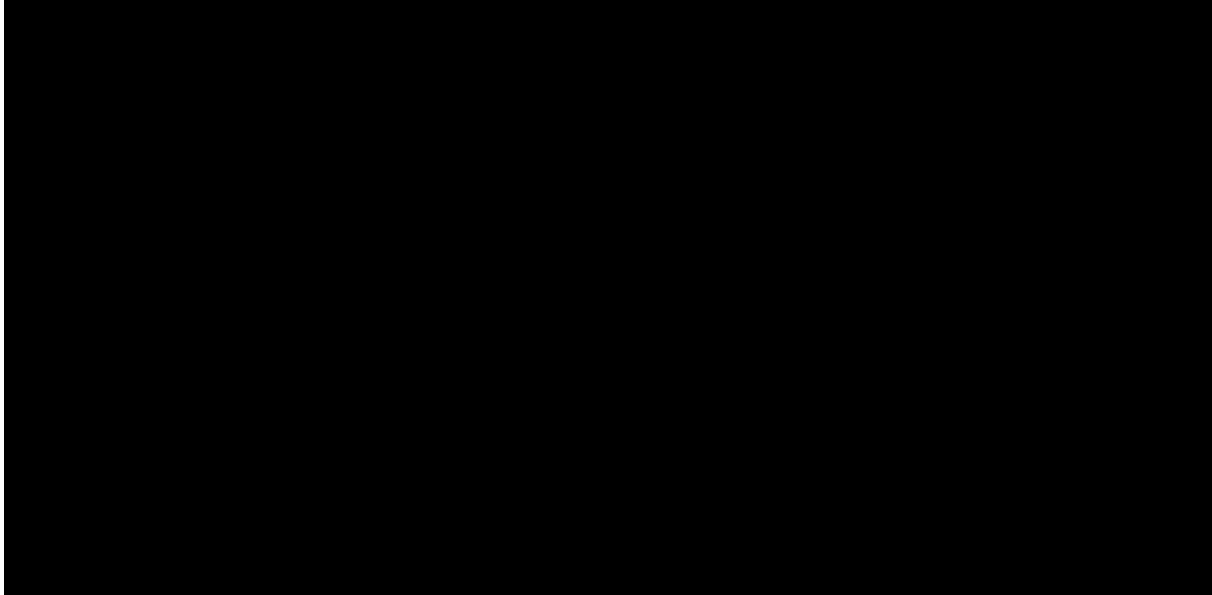
MY20 8L90 Gen2 IPTV/CPV - Application/Power cube

	T1 – MQE/L3B	T1- MQE/L84	T1- MQE/All
IPTV (12 mis)	36.1	12.7	16.37
CPV (12mis)	████	████	████
Compass PPH	18.1	6.6	8.32
Sold Volume	17,558	93,454	111,012



10 RWD Transmission Warranty

10 speed Warranty Journey



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10 RWD Transmission Quality

Where are we with 10 speed Quality and Why?



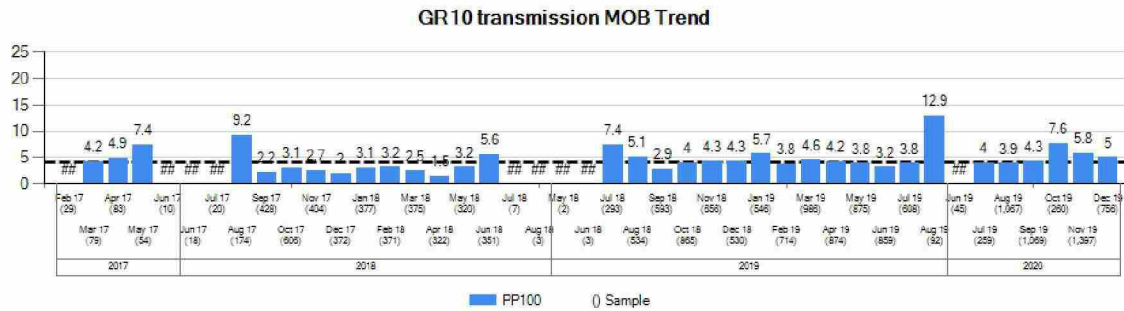
LINKED BACK UP SLIDES

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10 RWD Transmission Compass - MOB



Measures	2017	2018	2019	2020
PP100	5.3	3.1	4.3	4.8
Sample	255	4,148	9,030	4,853

- GR10: Best launch year performance in Full Size SUV and LDPU segments.
- Single digit compass PPH in Light Duty Pick Up in launch year.
- Customers love 10 speed drivability and fuel economy in those vehicles!!

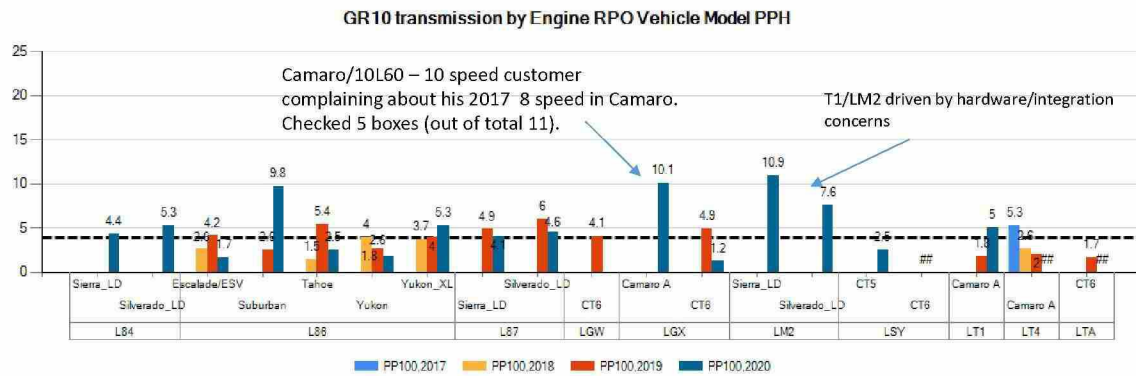


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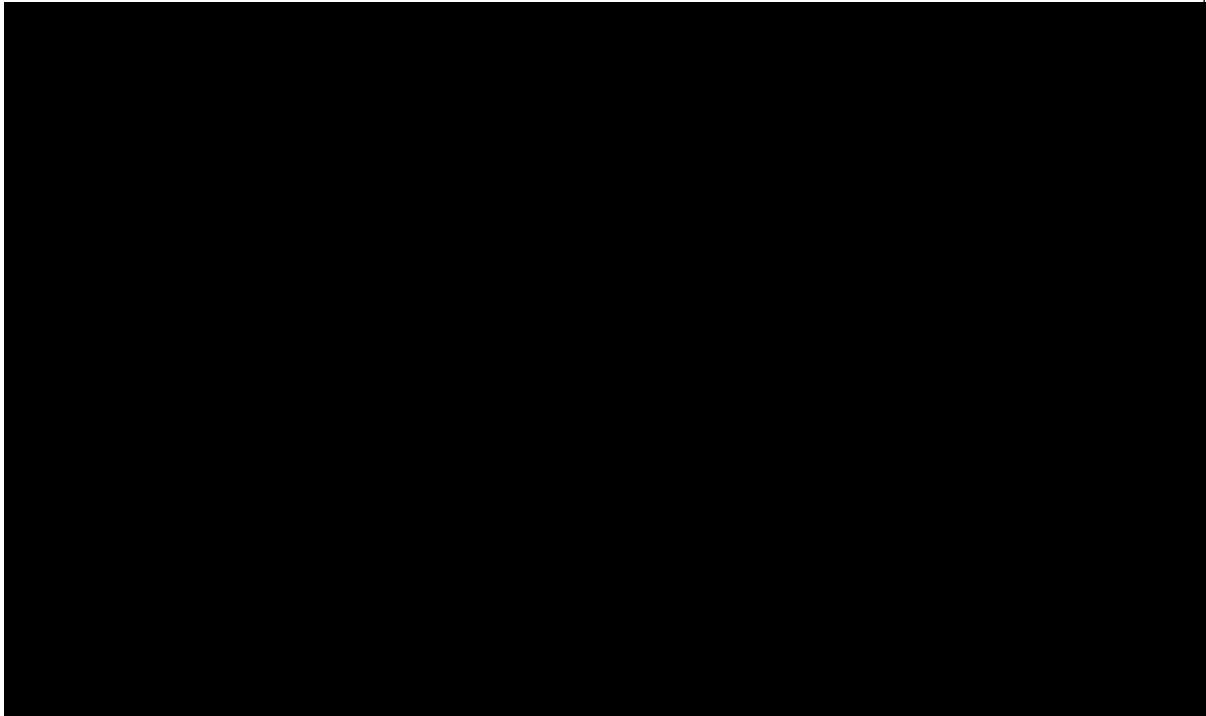
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10 RWD Transmission Compass - GMNA



10 RWD Transmission IPTV



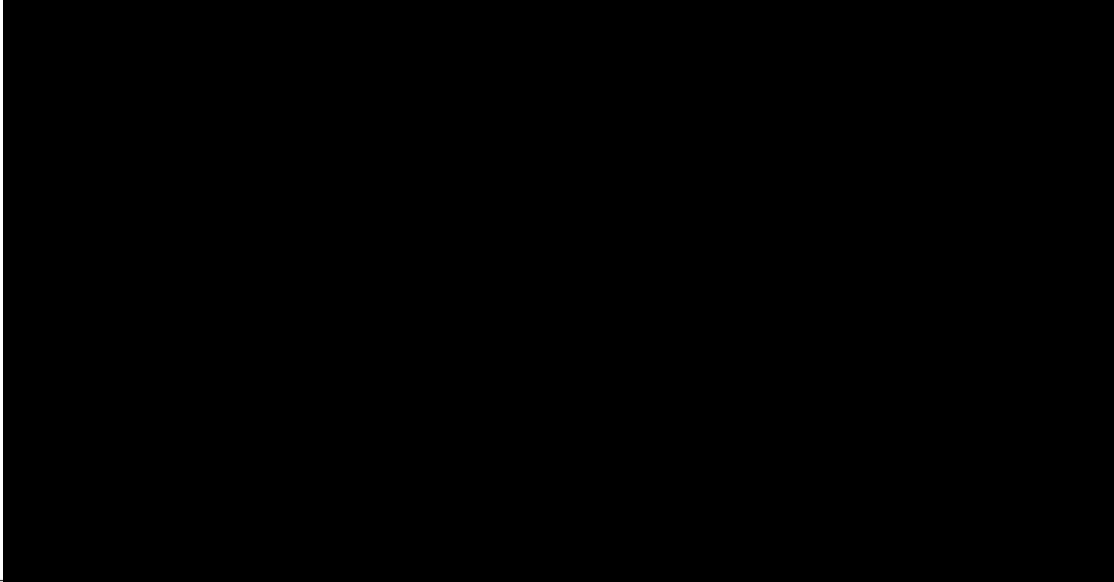
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12

8 Speed RWD Gen 2 Quality Improvement

8 Speed RWD Gen 2 Highlights and Applications



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13



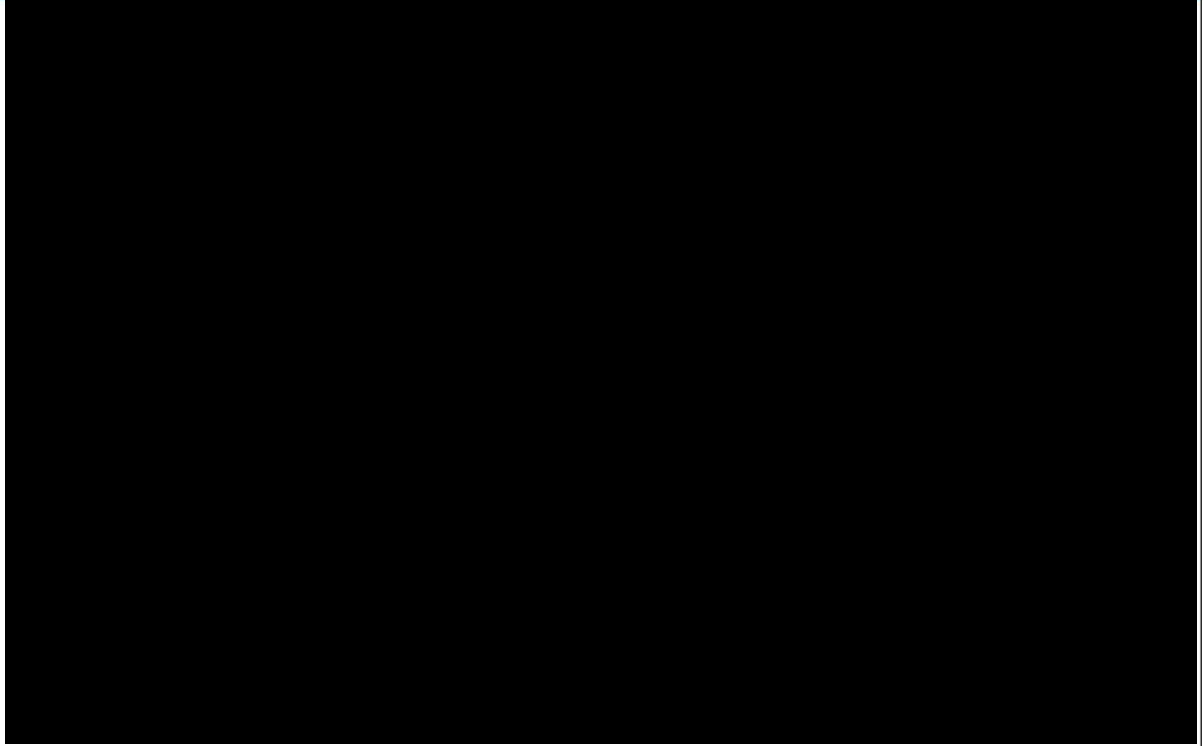
Program Management to provide this chart

Chart Required: Meeting Forums – GPSSL, VPE

Program Timing:

Add a red line to show where the program is currently at in the GDPD process

Current Capital Status

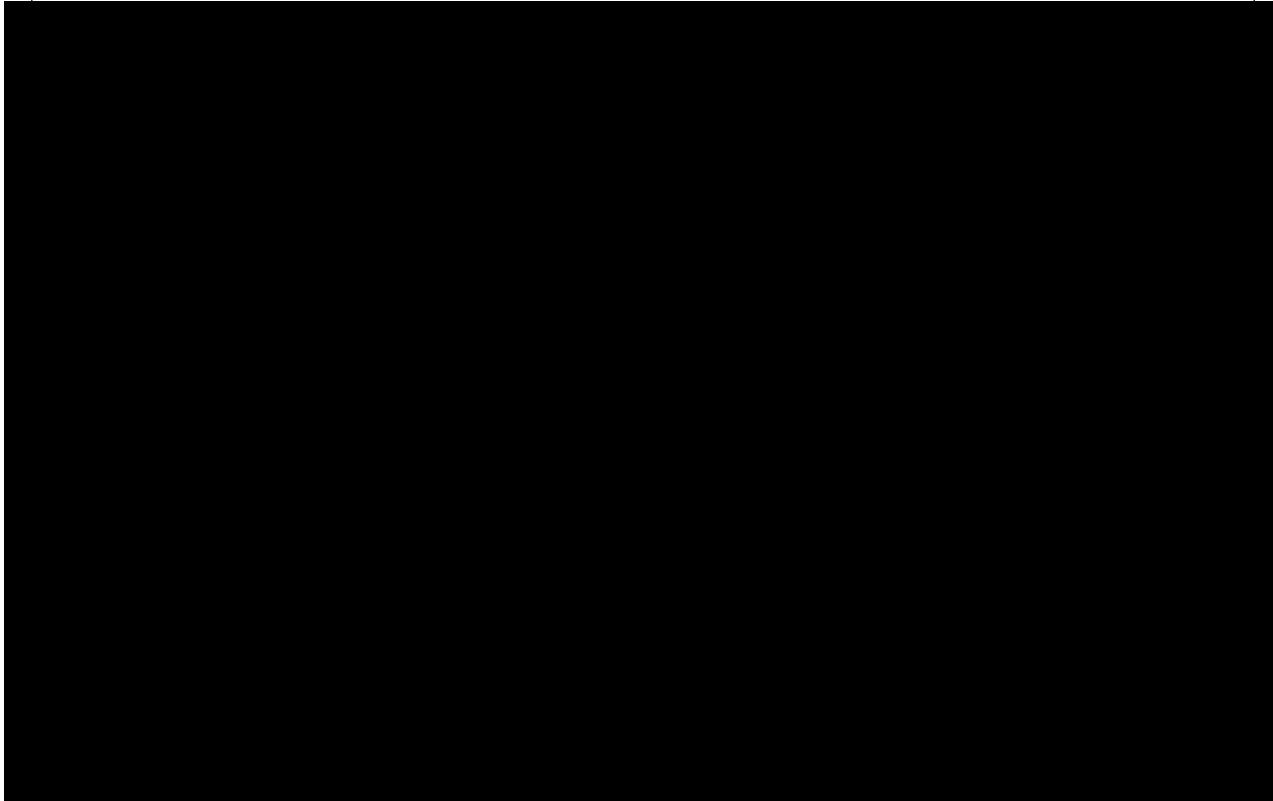


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8 RWD Transmission Gen 2 Improvements



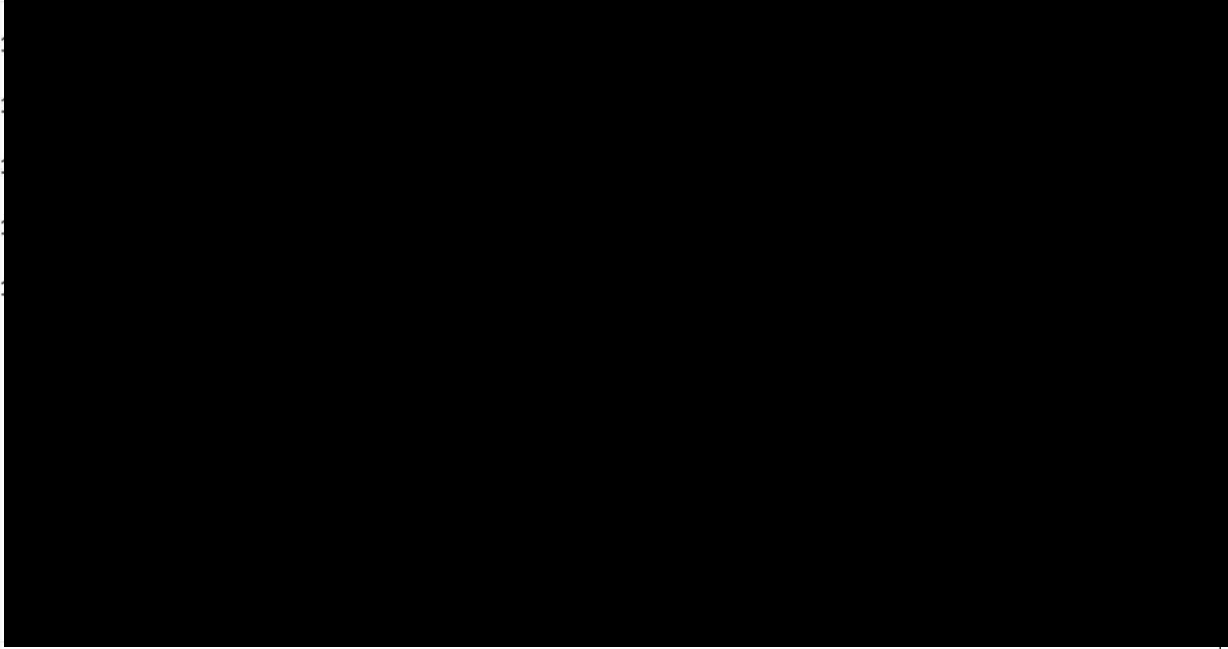
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16

8 RWD GEN1 to GEN2 – IPTV WALKDOWN



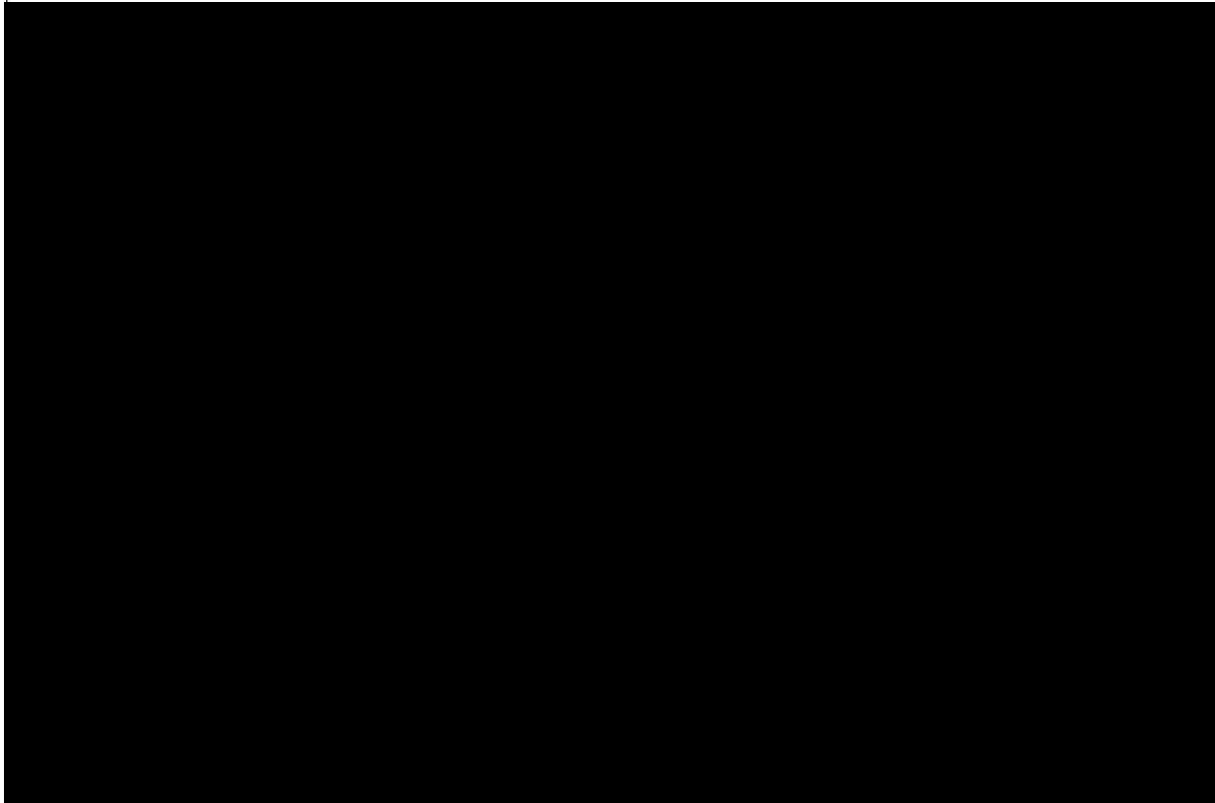
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8 RWD GEN1 to GEN2 – CPV WARRANTY IMPACT PROJECTION



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18

8 RWD GEN1 8L45 – IPTV TREND CHART

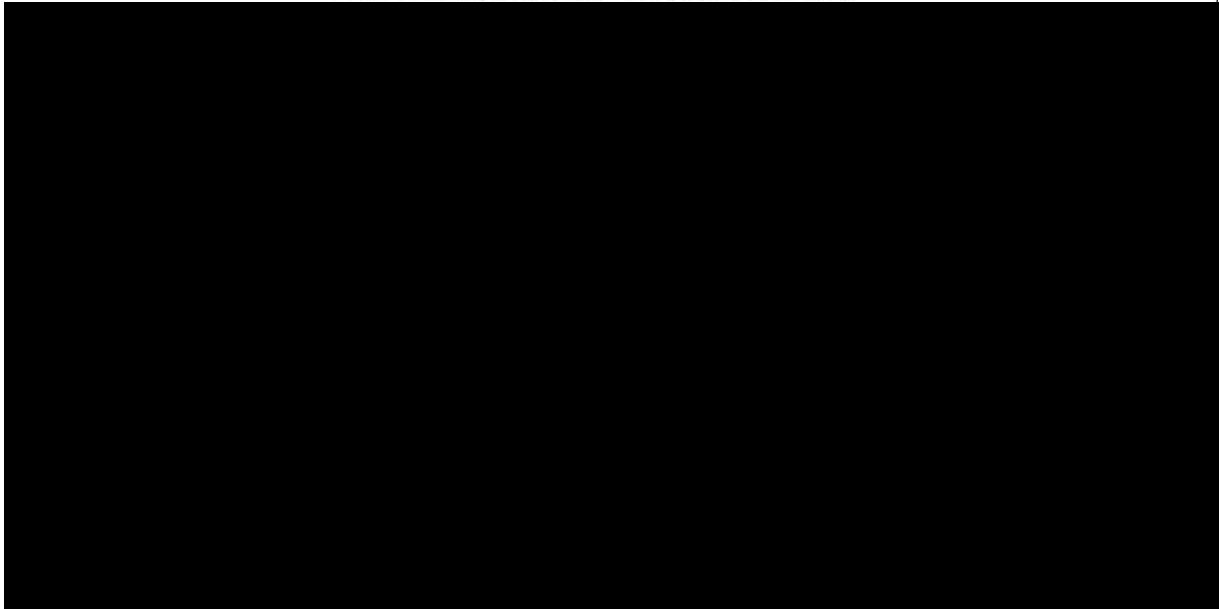


Global Quality

IPTV - Warranty 2, 6 and 12 MIS

Status: May 2020 (26Apr:2020)

GM North America - Spec: Transmission - 8L45
PROPULSION SYSTEMS - GEARBOX OBJECTS



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8 RWD GEN1 8L90 – IPTV TREND CHART

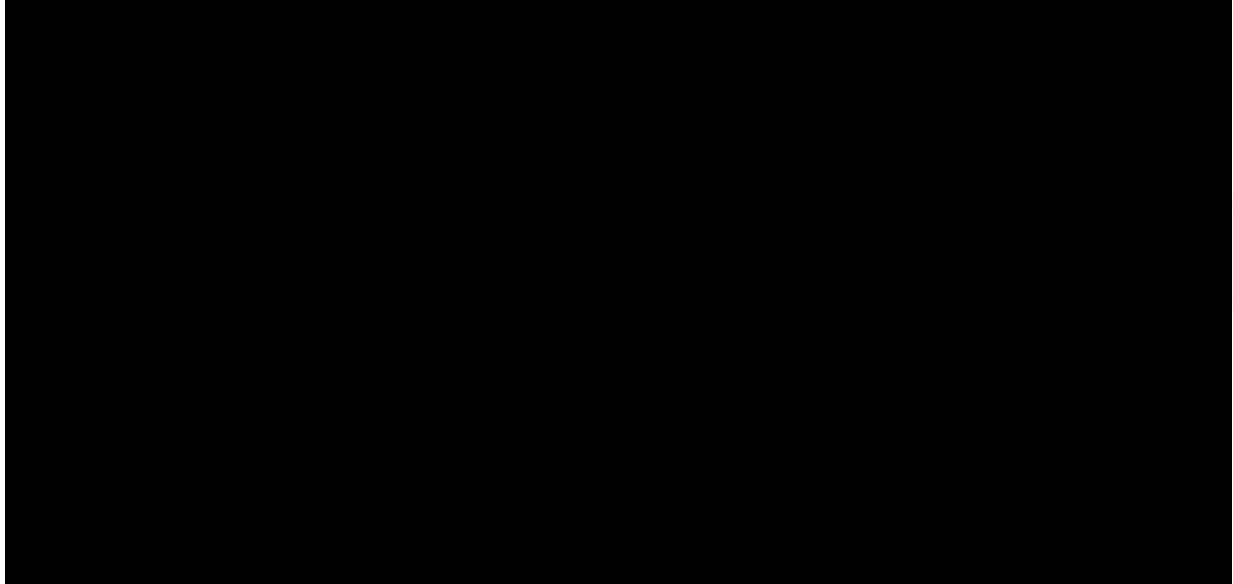


Global Quality

IPTV - Warranty 2, 6 and 12 MIS

Status: May 2020 (26Apr-2020)

GM North America - Spec: Transmission - 8L90
PROPULSION SYSTEMS - GEARBOX OBJECTS

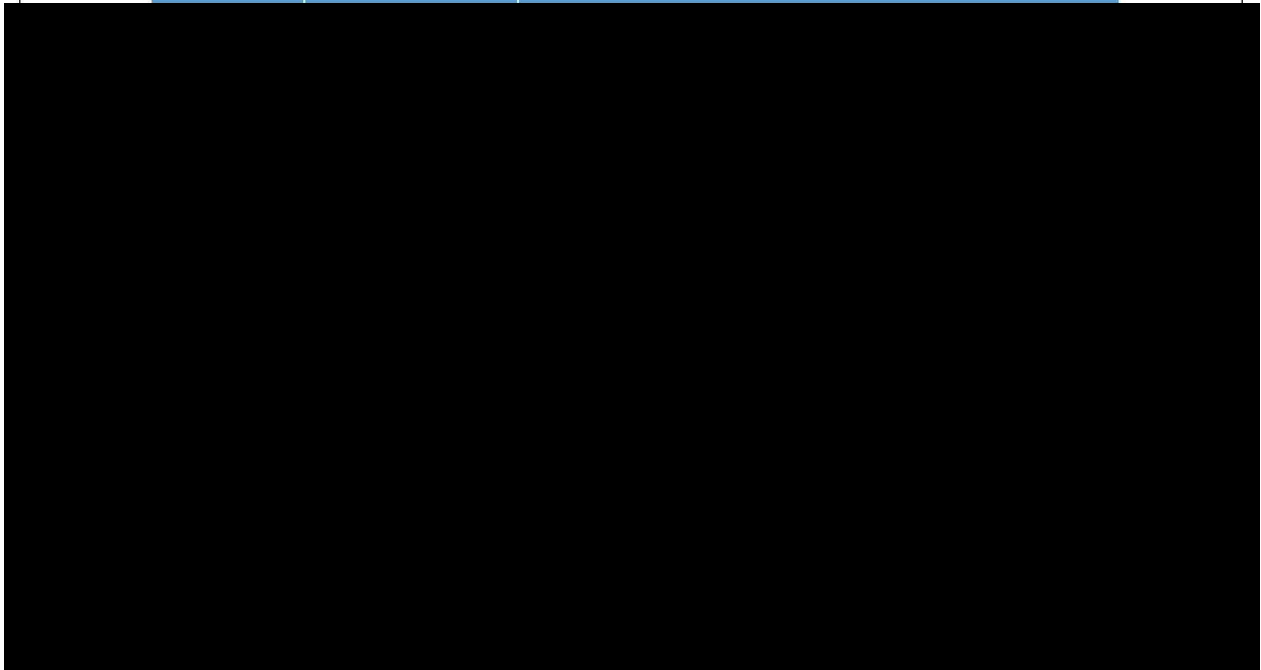


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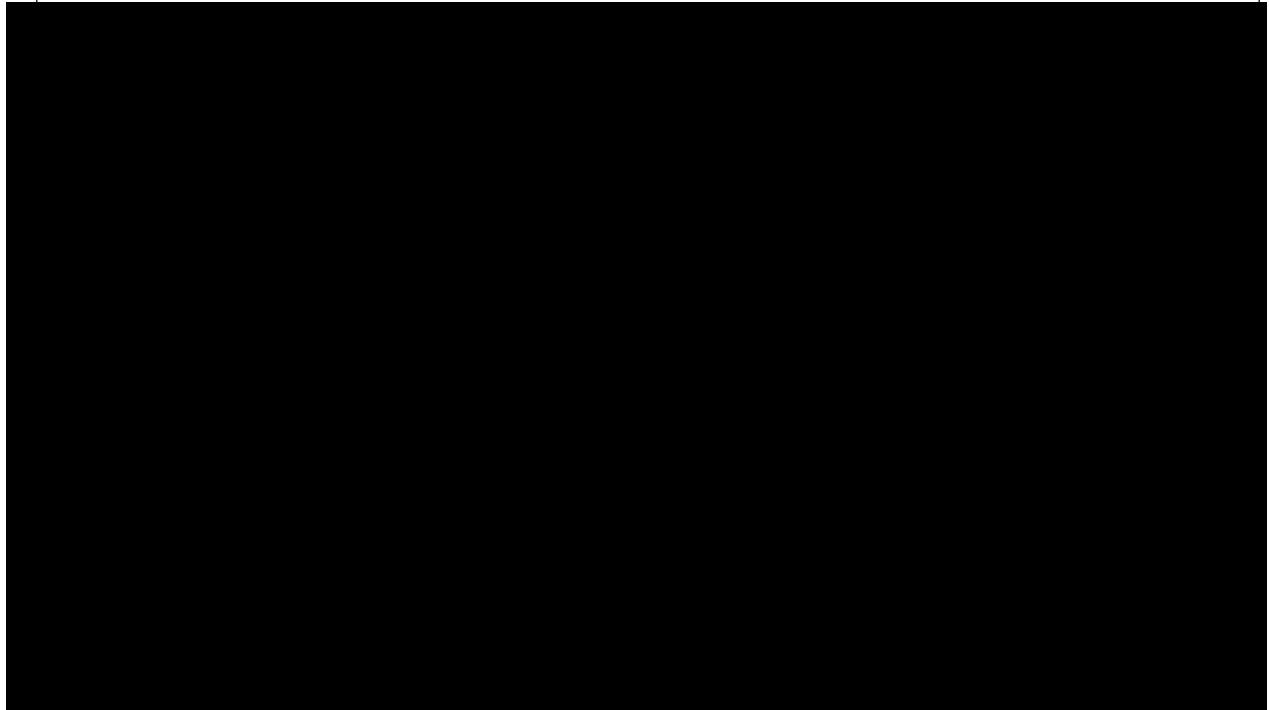
20

8L90 & T1XX 8RWD vs 10RWD - Quality Data		
	8L90	T1XX



8L45 RWD - Quality Data						
	8L45		MST		Camaro	
	<u>MY19</u>	<u>MY20</u>	<u>MY19</u>	<u>MY20</u>	<u>MY19</u>	<u>MY20</u>
IPTV (12 MIS)	86.8	13.8	106.8	14.9	15.7	3.4
CPV (12MIS)	████	████	████	████	████	████
Compass (PPH)	14.3	9.5	14.9	9.8	11.0	4.1
Volumes (Sold)	166,829	31,204	130,383	27,520	25,795	3684

8 SPEED RWD GEN2 IMPROVEMENTS ANALYTICAL RESULTS



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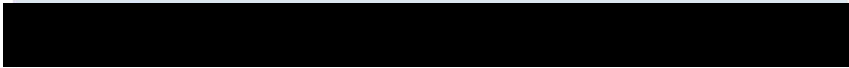
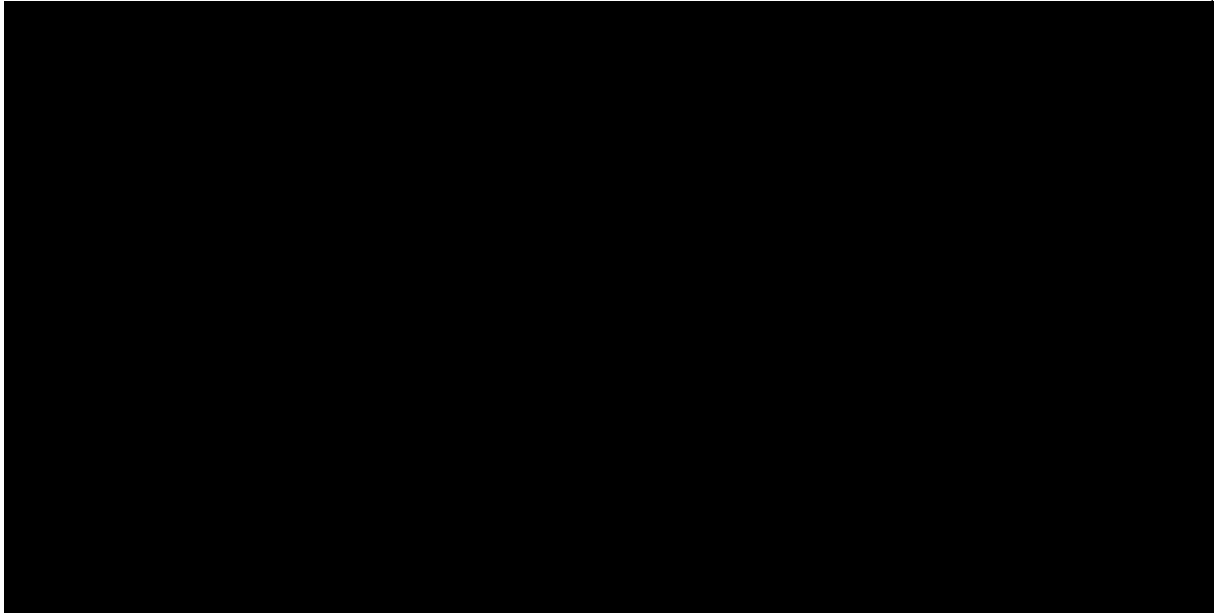
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8 RWD Transmission Volume Chart

8 RWD Demand

BP20 Jan Update File

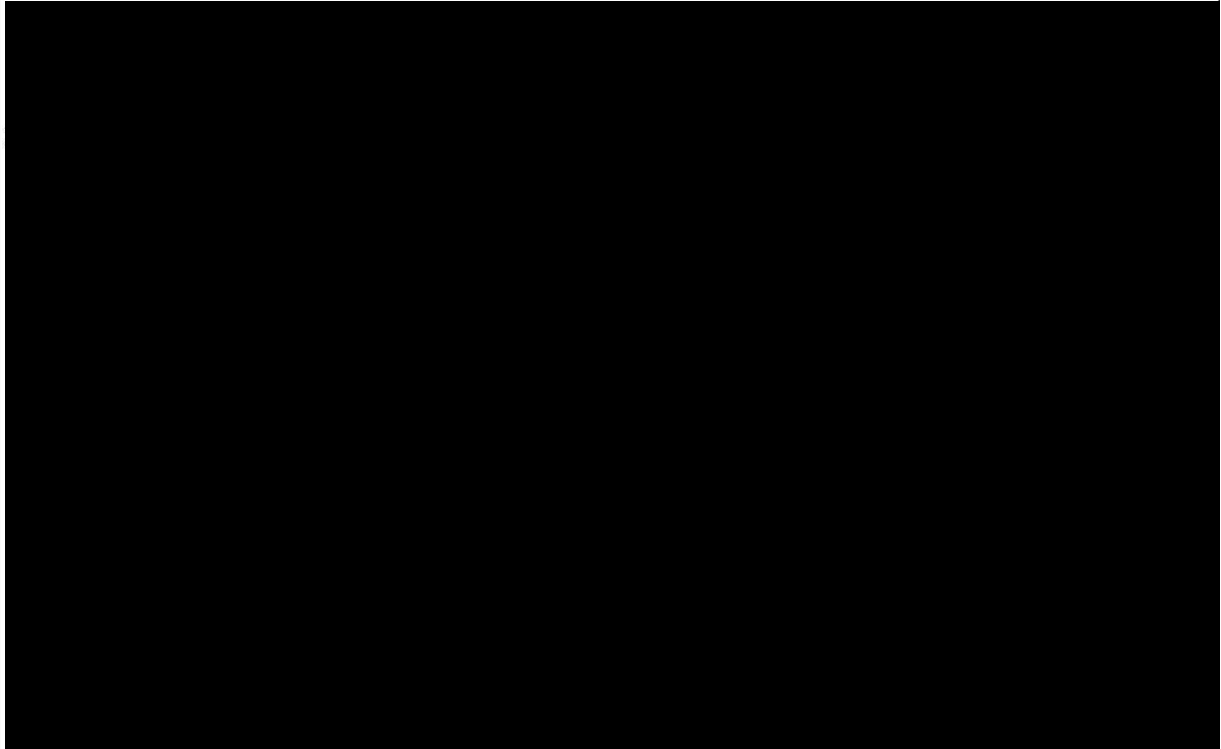


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**Truck LD PU Volume Mix Requirements
POR vs Required if No 10 RWD Capacity Increase**

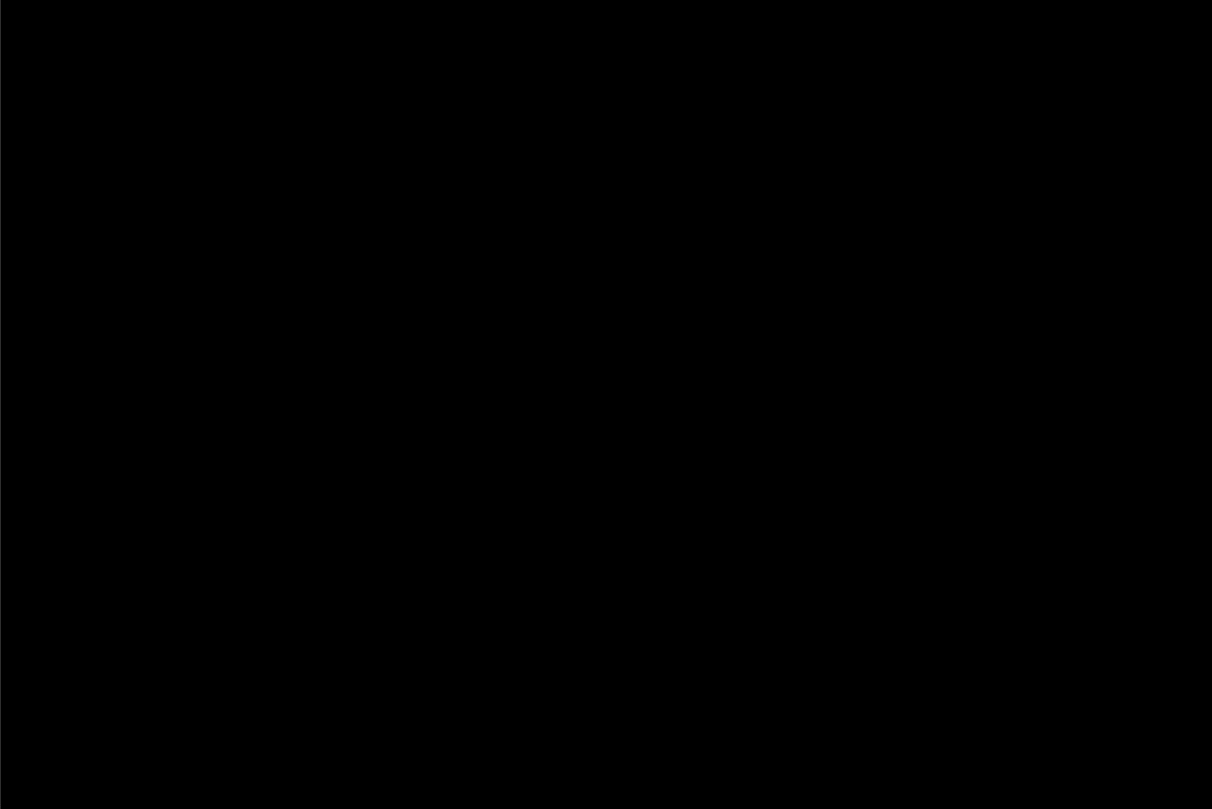


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8 RWD Gen 2 Implementation Timing Changes



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8L90 L3B & L84 / MQE Comparison Analysis

Executive Summary – Quality updates

Background:

- MY20 L3B / MQE IPTV avg of 39.1 down from MY19 IPTV avg. of 60.6 (21.5 IPTV Improvement)
- MY20 L84 / MQE IPTV avg. of 12.7 down from MY19 IPTV avg. of 41.1 (28.4 IPTV Improvement)

Highlights:



8L90 L3B / MQE Compass & Integration

20MY L3B Compass Performance – 15.5 PPH



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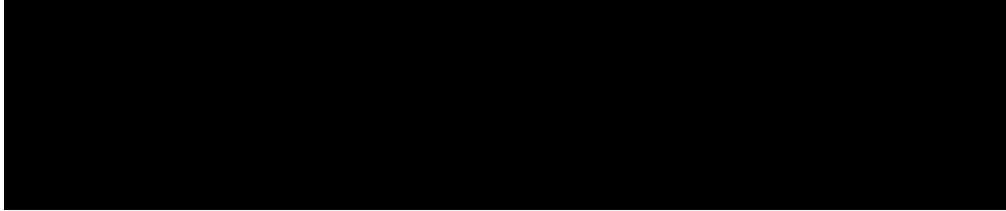
8L90 GVAN MY20 & MY19 Comparison Analysis

GVAN- Quality updates

Background:

- MY20 8L90 GVAN IPTV avg. of 13.9 up from MY19 IPTV avg of 6.6 (7.3 IPTV Increase)

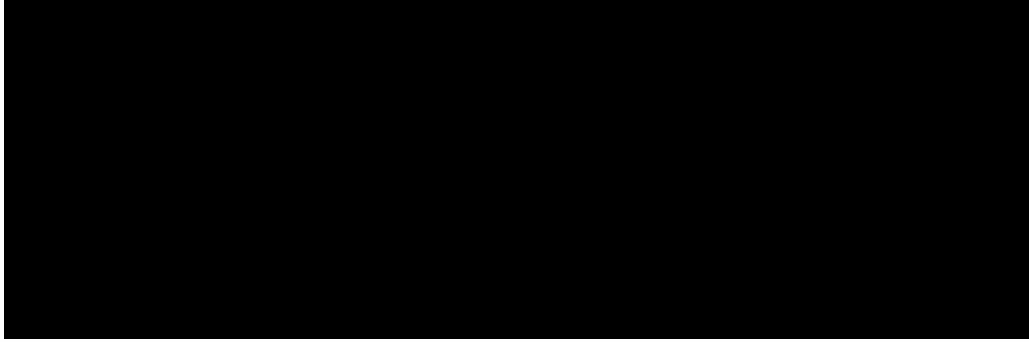
Highlights:



Next Steps/Help needed



Back up for Cancel Programs documentation of impacts



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30

EXHIBIT 13



Deposition of:
Eric Bloink

September 22, 2021

In the Matter of:

**Won, Wesley et al. v. General Motors,
LLC**

Veritext Legal Solutions

800-734-5292 | calendar-dmv@veritext.com |

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

WESLEY WON, et al., individually and
on behalf of all others similarly situated,
Plaintiffs,

vs.

Case No. 2:19-cv-11044

Hon. David M. Lawson

Mag. Judge David R. Grand

GENERAL MOTORS, LLC,

Defendant.

The Confidential Videotape Deposition of ERIC BLOINK
Taken Via Remote Zoom Videoconference
Commencing at 8:59 a.m.
Wednesday, September 22, 2021
Stenographically reported by:
Joanne Marie Bugg, CSR-2592, RPR, RMR, CRR

1 APPEARANCES:

2
3 DOUGLAS J. MCNAMARA

4 Cohen Milstein Sellers & Toll PLLC

5 1100 New York Avenue NW

6 5th Floor

7 Washington, D.C. 20005

8 202.408.4600

9 dmcmamara@cohenmilstein.com

10 Appearing on behalf of the Plaintiff.

11
12 JEREMY D. ROUX

13 Kirkland & Ellis

14 300 North LaSalle

15 Chicago, Illinois 60654

16 312.862.2000

17 jeremy.roux@kirkland.com

18 Appearing on behalf of the Defendant.

19
20 ALSO APPEARING VIA ZOOM VIDEOCONFERENCE:

21 Steve G. Calamusa, Esq.

22 Ted Leopold, Esq.

23 Justin Dloski - Videographer

24 Joanne Marie Bugg - Stenographer

25

1 is, C-A-S-H-A-T-T?

2 A. I do not.

3 Q. Were you under any time constraints in terms of when
4 you were supposed to come up with a resolution to the
5 8L transmission warranty claims you were looking at?

6 A. No. There's no time constraints. It's really to just
7 put in as much time as it takes to kind of get to the
8 correct resolution that everyone agrees to.

9 Q. Got you. All right. Mr. Gonzalez wrote to Victor Roses
10 and Dan Cashatt after your meeting. "I met with the
11 warranty cost recovery people today re: Eight speed
12 shudder warranty. I provided them with some background
13 around the issue." I realize I'm not sharing this with
14 you, so I'm reading it as if I am. Let me fix that.
15 "I met with the warranty recovery people today re:
16 Eight speed shudder warranty. I provided them with
17 some background around the issue. Because of the
18 tremendous warranty spend associated with this, it gets
19 a lot of attention, and that team has to make an
20 assessment about warranty cost ownership." I think you
21 said it was like [REDACTED] or so was the warranty
22 spend?

23 A. Correct.

24 Q. Can you give me some perspective on whether that's
25 tremendous, extraordinary, normal? How big, if at all,

1 is \$131 million warranty spend for GM?

2 MR. ROUX: Objection. Form.

3 A. You know, I can't -- I can't speak to how it is on the
4 total scale. I mean, for me it's the largest case I've
5 worked on personally.

6 BY MR. MCNAMARA:

7 Q. And you've been there for five years?

8 A. Correct.

9 Q. What's the next largest case?

10 A. Good question. I can't think of it off the top of my
11 head, to be honest with you. I've had some other, you
12 know, large cases though.

13 BY MR. MCNAMARA:

14 Q. How many others in the hundreds of millions?

15 A. None in the hundreds of millions.

16 Q. Okay. Let me ask you this way. How many other over
17 [REDACTED]?

18 A. I haven't worked on another one over [REDACTED].

19 Q. Okay. Then I think Bob goes on in his email to explain
20 something where he talked about ordinary warranty
21 terms. So and then he wrote, "No argument that GM is
22 primarily responsible, but there are still questions
23 about whether our suppliers have zero ownership or some
24 small amount. Not sure if this will go anywhere. Please
25 keep this internal to GM." Do you know why he wanted

1 A. Yes.

2 Q. Okay. And this same rationale for deviation, this would
3 also apply to ZF, correct?

4 A. I believe so, yeah. We didn't really work a lot on the
5 ZF portion. I focused primarily on Schaeffler.

6 Q. Well, the same rationale, and I think this goes to the
7 spreadsheet we just looked at, that it's the same
8 collateral damage claims as LuK more than likely not
9 pursuing. You reached the same conclusion, right, not
10 to seek any contribution from ATF?

11 A. Correct.

12 Q. Based upon the same rationale about the ATF being the
13 root cause?

14 A. Correct.

15 Q. So GM has paid [REDACTED] percent of all the warranty claims
16 related to torque converter shudder claims; is that
17 fair?

18 A. Yes.

19 Q. And as you sit here today on behalf of GM, can you tell
20 me is there any supplier that GM has found at all
21 responsible for any of the warranty claims related to
22 shudder or torque converter for 8L transmissions?

23 MR. ROUX: Objection. Form.

24 A. [REDACTED]

25 MR. MCNAMARA: At this point, I'll pass the

CERTIFICATE OF NOTARY

STATE OF MICHIGAN)

) SS

COUNTY OF WAYNE)

I, Joanne Marie Bugg, certify that this remote deposition was taken before me on the date hereinbefore set forth; that the foregoing questions and answers were recorded by me stenographically and reduced to computer transcription; that this is a true, full and correct transcript of my stenographic notes so taken; and that I am not related to, nor of counsel to, either party nor interested in the event of this cause.



Joanne Marie Bugg, CSR-2592

Wayne County, Michigan

My Commission expires: 2-26-2025

Page 80

1 Jeremy Roux, Esquire

2 jeremy.roux@kirkland.com

3 October 1, 2021

4 RE: Won, Wesley Et Al. v. General Motors, LLC

5 9/22/2021, Eric Bloink (#4786184)

6 The above-referenced transcript is available for
7 review.

8 Within the applicable timeframe, the witness should
9 read the testimony to verify its accuracy. If there are
10 any changes, the witness should note those with the
11 reason, on the attached Errata Sheet.

12 The witness should sign the Acknowledgment of
13 Deponent and Errata and return to the deposing attorney.
14 Copies should be sent to all counsel, and to Veritext at
15 cs-midatlantic@veritext.com

16
17 Return completed errata within 30 days from
18 receipt of testimony.

19 If the witness fails to do so within the time
20 allotted, the transcript may be used as if signed.

21
22 Yours,

23 Veritext Legal Solutions
24
25

EXHIBIT 14

Message

From: Eric Bloink [/O=GM/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=DD56FEB30F9B426F853F0B92897BF5B7-JZXZ2M]
Sent: 8/13/2019 5:10:31 PM
To: Guy Kebbe [guy.kebbe@gm.com]
Subject: RE: Torque Converter Slide(s)
Attachments: 8SpeedTCWarranty.pptx

Guy,

Attached are a few slides to present Thursday. Let me know if you think there is anything else we should include or leave out. I know that the total is higher now than I had initially said, I remembered that Schaeffler had another recovery group that Demetrius had already submitted a 0% TF on before I took over Transmission. This RG currently has \$[REDACTED] in spend processed through it, which now brings the total warranty spend for this issue to over \$[REDACTED]

Best Regards,

Eric Bloink
OWT Cost Recovery Lead
General Motors
Mobile: 586-980-0502
Email: eric.bloink@gm.com

From: Guy Kebbe
Sent: Monday, August 12, 2019 7:05 PM
To: Eric Bloink <eric.bloink@gm.com>
Subject: Torque Converter Slide(s)

Hey Eric,

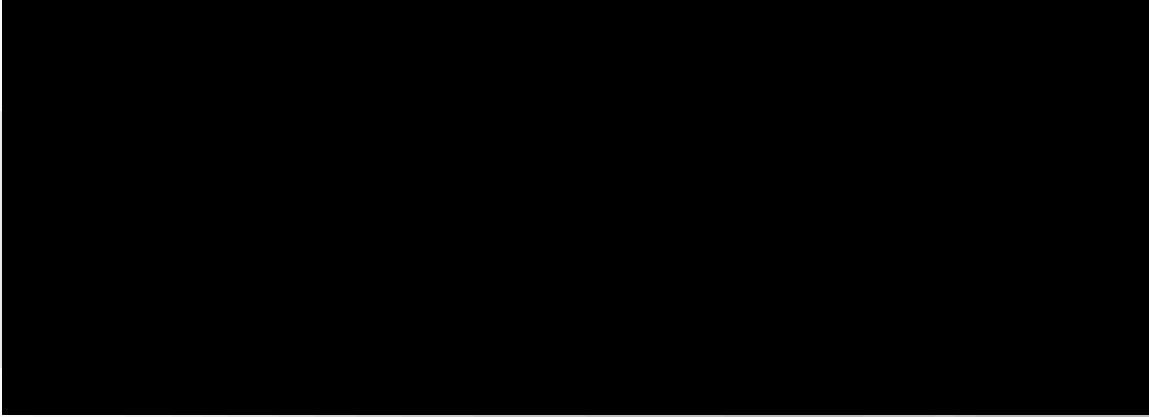
Just a reminder to send me a slide or two showing a summary of the Torque converter situation for Thursdays Intake Meeting.

Just need something that shows high level insight to get the ball rolling.

Thanks,
Guy

Exhibit
PX 190

8 Speed Torque Convertor Warranty



[DateTi
me]

Driving the Future Together



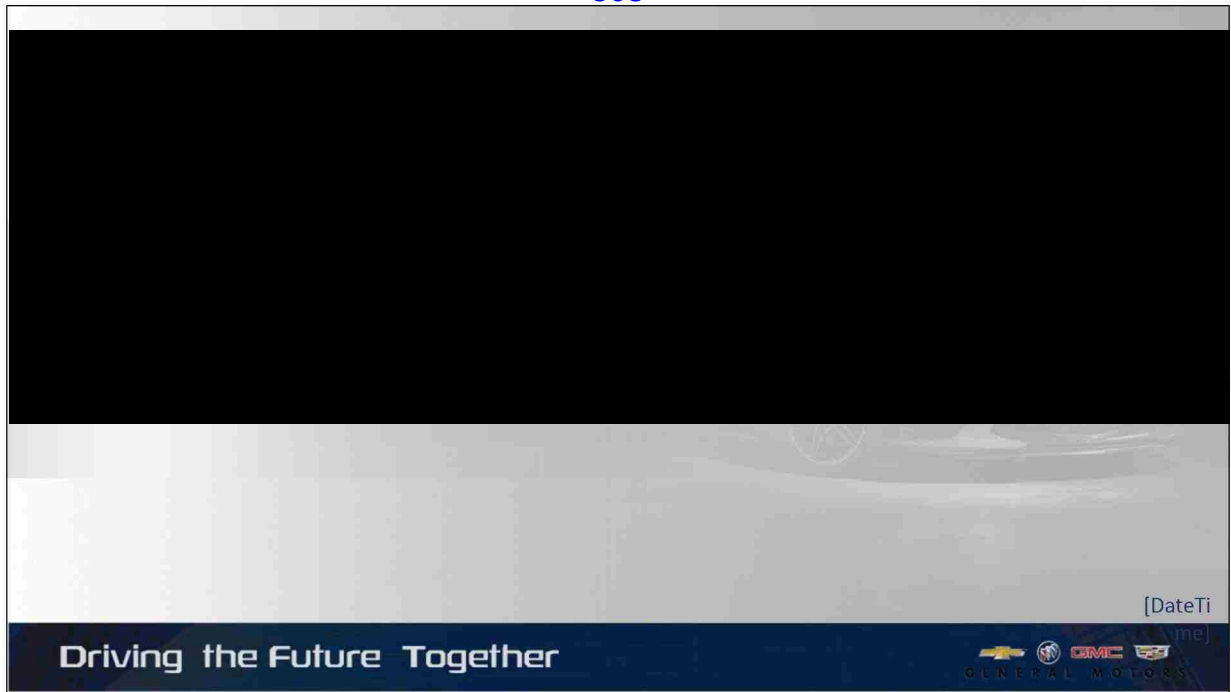


EXHIBIT 21

Message

From: William J. Goodrich [/O=GM/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=8C854C04CDC24C178AF3490814D1E5B4-MZ3BT4]
Sent: 10/17/2013 7:18:22 PM
To: Angela P. Willis [angela.p.willis@gm.com]
Subject: RE: Status - Corvette 8-Spd Shudder

Exhibit
0070

Hi Angela,

I think we started an EWO for internal tracking, but I don't think we are actually ready to p-release per your comments. If we do it, I wouldn't be able to do it until 2017 Model year, which is year 3 of the 8-speed.

Thanks

Bill

From: Angela P. Willis
Sent: Thursday, October 17, 2013 9:18 AM
To: William J. Goodrich
Subject: Fw: Status - Corvette 8-Spd Shudder

Question for you, Bill.

I got an IM yesterday from Brian Maghran asking about [REDACTED] I told him we have to hold with that [REDACTED]

[REDACTED] I see this below and wanted to ask you this....

Angela Willis
Lubricants Manager
Fuels and Lubricants
GM Powertrain
(734) 904-7714
angela.p.willis@gm.com

----- Forwarded by Angela P. Willis/US/GM/GMC on 10/17/2013 09:15 AM -----

From: Randy L. Melanson/US/GM/GMC
To: Mark H. Featherly/US/GM/GMC@GM, Victor M. Roses/US/GM/GMC@GM, Richard B. Vykydal/US/GM/GMC@GM
Cc: shawn.look@gm.com, Tim Anguish/US/GM/GMC@GM, Angela P. Willis/US/GM/GMC@GM, Khaled Zreik/US/GM/GMC@GMEXCHANGE, William J. Goodrich/US/GM/GMC@GMEXCHANGE
Date: 10/17/2013 09:09 AM
Subject: Status - Corvette 8-Spd Shudder

All,

Per our discussion at PMT yesterday, as well as last Friday's meeting w/ vertical team, here is my attempt to summarize where we are, and of ongoing actions to fix this issue. Per Bill's comments last Friday, cal changes are now at the forefront of avoiding the specific TCC usage areas where shudder has been observed, despite the directionally negative impact on FE.

However, since [REDACTED]

[REDACTED] As you know, there are 2 separate issues that we believe to be at least partially responsible, either singly or in combination, for green shudder in this system:

[REDACTED] results in significantly less positive/ marginally negative (green) friction curves with the Luk material than was originally hoped for. Chemistry differences are thought to be the reason for this.

2. [REDACTED] as multiple tests over the last 9 months have shown. Its [REDACTED]
[REDACTED] In contrast, [REDACTED]
[REDACTED]

Therefore, in light of these facts, the following actions are being pursued:

a). [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

b). [REDACTED]
[REDACTED] Tim is currently coordinating w/ Luk personnel to discuss test specifics and determine leadtime.

[REDACTED]
[REDACTED]

In addition, the following actions are also being pursued:

c. [REDACTED]
[REDACTED]
[REDACTED]
d. [REDACTED]
[REDACTED]
e. [REDACTED]
[REDACTED] Timing is TBD, but should only take days to complete.

Please let me know if any questions or comments.

Thanks,
Randy

Randy L. Melanson

Technical Specialist - Starting Devices
TC Isolator and Friction Systems
248-249-9441

GM Powertrain
Transmission Engineering
823 Joslyn Ave.
Pontiac, MI 48340-2920
Cube 2AD54, Bldg. B, 2nd Floor
Mail Code 483-730-202

EXHIBIT 23

From: Powell, Jason <Jason.Powell@AftonChemical.com>
Sent: Thursday, September 17, 2015 9:55 AM
To: Perry, John <John.Perry@AftonChemical.com>
Subject: FW: 212B fluid Shell vs SK

FYI John...meant to add you to the list.

Jason Powell
ATF OEM Technologist
Phone: 804-788-5352
Fax: 804-788-6243
Email: jason.powell@aftonchemical.com



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From: Powell, Jason
Sent: Thursday, September 17, 2015 9:52 AM
To: Macpherson, Ian; Pheneger, Don; Fitzgerald, Andrew; Cleveland, Christopher (Chris.Cleveland@AftonChemical.com)
Cc: Glasgow, Michael (Michael.Glasgow@AftonChemical.com); Dong, John; McCombs, Tracy
Subject: RE: 212B fluid Shell vs SK
Call report from 9/16/15
Afton: Ian Macpherson, Jason Powell, Don Pheneger, Andrew Fitzgerald
GM: Khaled Zreik, Randy Melanson
Background

Report

Randy reported that there is a spike in shudder related warranty claims for the months of Oct-Nov 2014 -- between 15 and 20 per month so far (this number will likely rise as more mileage is accumulated). Some of the claims are from very low mileage vehicles and some from "higher" mileage vehicles though no actual numbers were offered.

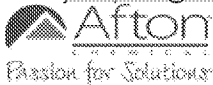
From December 2014 through June 2015 they have received 1-2 warranty claims related to shudder.

should be ready by 9/24/15. Randy thinks that Tim Anguish will be receiving BOB and WOW converters sometime soon and I offered that Afton would run testing on the fluids. Randy will let us know if/when they receive any fluids.

I got the sense that Randy is not convinced that the misblend is the root cause as he knows that the ATF-212-B/WFP6300 friction system is susceptible to shudder.

If anyone that was on the call has anything to add or correct, please feel free.

Jason Powell
ATF OEM Technologist
Phone: 804-788-5352
Fax: 804-788-6243
Email: jason.powell@aftonchemical.com



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From: Khaled Zreik [<mailto:khaled.zreik@gm.com>]
Sent: Tuesday, September 15, 2015 8:41 AM
To: Powell, Jason; Glasgow, Michael; Cleveland, Christopher; Dong, John
Subject: RE: 212B fluid Shell vs SK

Hello Jason,

There are some warranty issue on the 8 speed TC that is tracked back to Sept -Nov 2014. This is the period when we had the Shell misblend with Yubase 6. Would it be possible to run friction test using Luk WFP 6300 comparing Shell 212B with the milblended formulation (PAO 2 & Yubase 6).

Thanks,
Khaled

From: Khaled Zreik
Sent: Monday, September 14, 2015 2:39 PM
To: Powell, Jason (Jason.Powell@AftonChemical.com); Michael Glasgow (Michael.glasgow@AftonChemical.com); Christopher S. Cleveland (chris.cleveland@aftonchemical.com); John Dong (john.dong@aftonchemical.com)
Subject: 212B fluid Shell vs SK

Hello Gentlemen,
Do we have friction data for 212B fluid with WFP6300 comparing Shell vs SK formulations (PAO base oil & Hitec 3491 A).
Thanks,
Khaled

**Exhibit
PX 230**

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EXHIBIT 24

March 2016

Wednesday, March 02, 2016 9:07 AM

7

Randy

BW6100 has bad negative gradient when green; gets better but nobody has an appetite for more green shudder

Recent development over the weekend

LuK offering WFP6331 but Randy doesn't think it's any better

Maybe BW6600 or BW6910 would be better

Randy wants them run through GMWEAR test

8spd shudder is #1 warranty item in the company!!!

Randy says the solution is BW6910 plus a fluid modification (only 10% friction reduction is probably needed)

Choice to stay with LuK is driven by economics but not only

Randy's manager says they need to pick the best technical solution

Schedule for GMWEAR test

All materials for Tim A have finished

Randy wants us to run WFP6331 in 212B

Starting today Option A in WFP6300

Shell 2013 oil also in queue

6300 in Option A

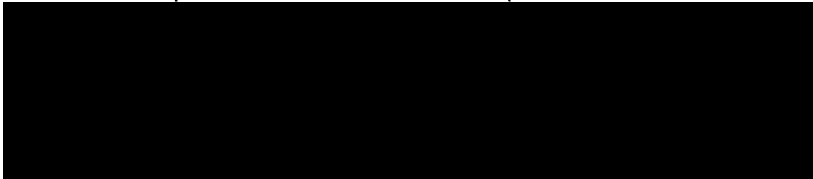
6300 in Option B

WFP6300 queue up recently (either just finished or later this week)

BW6100 also in queue

All materials with both top treats should also be queued

Mike to compile table of GMWEAR test queue



Randy wants to see the data. ACTION: Mechanical to finish reports



Reform work

They like 764-D, smooth front and higher dynamic friction

9

Glasgow, Cleveland, McCombs, Dong

New spec - not carryover technology

Not designed as a solution to 8spd shudder warranty

Production starting for MY2019

Sourcing to begin mid-2018

Redesign/relaunch of 8spd and Bolt (battery electric hybrid)

Timing is tight; candidate to SwRI in approx 2 weeks

All data by late May or June

Khaled to select best two fluids

Validation starts after selection and to take 1-2 years

**Exhibit
PX 231**

[REDACTED]

Criteria: #1 performance, #2 cost

[REDACTED]

Skip Watts is retiring in a month. His protégé Joel will replace him.

10

GM ATF Update

Randy is advising to target a friction reduction closer to 10% for RPM1, not 15%
Different Option B candidates reflect FM, dispersant and detergent components
How long will Option A or Option B last in a vehicle?
Depends on the condition of the friction material.
Rasheed (LuK) contacted Tim. Tracy will be available any time for a joint call.

[REDACTED]

Randy walked through their thoughts behind the GMWEAR queue but didn't change any priority.

[REDACTED]

May want to run a low mileage WOW fluid in GMWEAR. **ACTION: tentatively add to queue.**

Option A vehicle was still running as of Monday and was still not shuddering.

Mileage is roughly 1200 miles. Set aside to run the 2x2 matrix.

Still remains on the table for consideration

Option A: consolidate separate summary deck

GM okay for us to summarize separately.

Tim A. requests we clearly call out the friction difference between 212B and Option A in the summary.

FM Consumption slides

Why does it appear FM2 and FM4 have a step down in concentration relatively early then almost no change with mileage?

Bill Goodrich is concerned with how much FM4 drops so quickly. [I don't feel we sufficiently answered his questions.]

ACTION: Mike to plot FMs for BOB and WOW together on same graph

Friction Material analysis

What does all the analysis tell us?

Does it indicate part to part variation?

Can we identify or analyze any of the carbon rich regions?

Could we identify any assembly aides if they were on the material?

ACTION: Decide together with GM what data to share with Luk

We agree to share reference fluid results as well as Option A.

BW6100 as "Competitor 1"

They already have ULV data. We're hesitant.

Randy: Is there an affinity difference of FMs between Luk material and BW material?

11

Nathan

No feedback on Containment response

No feedback on weekly meetings

Not comfortable with removing Manufacturing from weekly agenda. Does not want separate meeting.

Email report updates may be acceptable. Really Dameon's call. Will talk with Dameon.

22

GM and LuK

Rashid

Randy, Tim, Khaled, Max, Shawn Look, Vic Roses, Zach, Bob G,

Tracy, Darryl, Andrew, Chris, John P, Mike,

Darryl presented for Afton

Randy led the discussion for GM

LuK produce the material in large sheets and randomly segment the material into small sections to produce clutches

Rashid emphasizes it's **impossible** for them to make the ID and OD material differently

Rashid questions whether the material variation leads somehow to shudder

LuK do not press the material during cutting but rather scissor cut it

ACTION: Darryl to measure oil drop time on ID vs OD

ACTION: recommend to measure 2-3 parts for similar variation

Microscopic analysis

[REDACTED]

Randy requested Rashid to supply the data

Porosity is key; more important than surface roughness

[REDACTED]

Darryl doesn't agree with Rashid's main emphasis on porosity.

How does friction modifier interaction change as friction material ages?

Randy asked this question 3 times. No clear answer provided.

ACTION: GM and LuK to explore this interaction for a deeper understand

WOW OD region is smooth and polished

Rashid thinks this is caused by an external contaminant

Nothing inside friction material can smear or embed within the friction material the way

Identify material differences between WOW clutch shudder vs degraded friction material after GMWEAR test

ACTION: Darryl to analyze clutch after GMWEAR test

Rashid expressed his appreciation and agrees our collaboration is helpful and will expedite finding a solution

22

Jon, Tracy, Chris, John, Mike, Dan, Ken

Jon - 18 slides

Mike - reviewed his slides

How much discussion / questions do we want to encourage?

Add "light bulb & so what" to each Strategic Learning slide

Section should lead into the description of an ideal ATF?

Ideal ATF or Fluid of the Future

Chris' section

Still rough state

Needs lots of cleansing of Afton proprietary or internal language

Need to review finished slides by Clay

Other ideas to be captured?

Early collaboration - tailored friction to hardware

In Tracy's section

Complexity

15 minutes each for Jon and Mike

30 minutes for Tracy and Chris

Logistics

24

GM ATF

No change to GMWEAR queue

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

No concerns from GM on the Containment Info submitted

Some questions around implementation timing

No meeting next week

Next meeting on April 7

Proposal to consider move to every 2 weeks

EXHIBIT 32

From: Randy L. Melanson <randy.l.melanson@gm.com>
Sent: Tuesday, May 10, 2016 9:29 AM
To: Glasgow, Michael <Michael.Glasgow@AftonChemical.com>; Tim Anguish <tim.anguish@gm.com>; Maxim Burgman <max.burgman@gm.com>; Khaled Zreik <khaled.zreik@gm.com>; Liping L. Wang <liping.l.wang@gm.com>
Cc: Angela P. Willis <angela.p.willis@gm.com>; Fitzgerald, Andrew <Andrew.Fitzgerald@AftonChemical.com>; Perry, John <John.Perry@AftonChemical.com>; Dong, John <John.Dong@AftonChemical.com>; Cleveland, Christopher <Chris.Cleveland@AftonChemical.com>; McCombs, Tracy <Tracy.McCombs@AftonChemical.com>; Pridemore, Dan <Dan.Pridemore@AftonChemical.com>
Subject: RE: SOR GRPIII+ contamination study

Hi Mike,
This is really eye opening. Somewhat surprised how badly the BW6100/GRPIII+ degraded, and how quickly.

Will be curious to see how much worse the slope gets w/ water/contamination in a brand new WFP6300/212B system (Test #'s 17-18), my guess is it will be one ugly betty.....we do know that 0.1% water contamination in a fresh vehicle system shudders right out of the gate.

Thanks,
Randy

From: Glasgow, Michael [mailto:Michael.Glasgow@AftonChemical.com]
Sent: Tuesday, May 10, 2016 9:06 AM
To: Randy L. Melanson <randy.l.melanson@gm.com>; Tim Anguish <tim.anguish@gm.com>; Maxim Burgman <max.burgman@gm.com>; Khaled Zreik <khaled.zreik@gm.com>; Liping L. Wang <liping.l.wang@gm.com>
Cc: Angela P. Willis <angela.p.willis@gm.com>; Fitzgerald, Andrew <Andrew.Fitzgerald@AftonChemical.com>; Perry, John <John.Perry@AftonChemical.com>; Dong, John <John.Dong@AftonChemical.com>; Cleveland, Christopher <Chris.Cleveland@AftonChemical.com>; McCombs, Tracy <Tracy.McCombs@AftonChemical.com>; Pridemore, Dan <Dan.Pridemore@AftonChemical.com>
Subject: FW: SOR GRPIII+ contamination study

Hello Randy et al,

Here's the summary slide of the GMWEAR tests [REDACTED]

[REDACTED] Your comments are valuable and sought after

John Perry prepared this nice slide. Final test reports should be available later today with the other friction gradient comparisons.

Best regards,
Mike

Michael B. Glasgow, Ph.D.
Advisor - OEM Technical Service
Afton Chemical
500 Spring St.
Shipping: 101 W. Byrd St.
Richmond, VA 23219
804-788-5239 (o)
804-836-6264 (m)
FAX 804-788-6243
Michael.Glasgow@aftonchemical.com

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AFTON_0000818

EXHIBIT

0234

EXHIBIT 33

From: Pridemore, Dan <Dan.Pridemore@AftonChemical.com>
Sent: Tuesday, July 26, 2016 8:14 AM
To: Glasgow, Michael <Michael.Glasgow@AftonChemical.com>; Riley, Dan <Dan.Riley@AftonChemical.com>; Ford, Beth <Beth.Ford@AftonChemical.com>; Cleveland, Christopher <Chris.Cleveland@AftonChemical.com>; Dong, John <John.Dong@AftonChemical.com>; McCombs, Tracy <Tracy.McCombs@AftonChemical.com>; Fitzgerald, Andrew <Andrew.Fitzgerald@AftonChemical.com>; Perry, John <John.Perry@AftonChemical.com>; Floyd, Dan <Dan.Floyd@AftonChemical.com>; Mendel, Rich <Rich.Mendel@AftonChemical.com>; Rock, Jon <Jon.Rock@AftonChemical.com>; Cundy, Kenneth <Kenneth.Cundy@AftonChemical.com>
Cc: Hobbs, Chris <Chris.Hobbs@AftonChemical.com>
Subject: RE: GM Telecon Update & Notes (July 21 2016)
Attach: July 21 2016 GM 8AT Meeting Deck v3.pdf

Good morning all,

Apologies in the delay to issue the notes from last Thursday GM Telecon. Attached is the slide deck used to facilitate the discussion. Highlights as follows:

- Afton's GM Wear Test Stand 6 is now re-calibrating after undergoing repairs. Should be back in operation next week.
- GMWear test discussion:
 - [REDACTED]
 - This test will be repeated with new Option B 212B fluid
 - GM believes we will still need to triple flush even with Option B fluid for a sufficient SF fix
 - Lots of time discussing re-prioritizing the GMWear Test queue
 - Chris Hobbs will be Afton Coordinator for GMWear Test
- Oil drop testing -- [REDACTED]
 - GM asked if possible to compare residue in plate pores with MWF contamination to GMWear Test results
- Vehicle Testing with Option B vs Baseline continues at GM with focus on shifting clutch performance. 7500 mile evaluation Should be available this week.
 - [REDACTED]
- Water Sensitivity - Randy showed Dex VI water contamination plots. MS-022 (carbon fiber) not as sensitive to water as paper material.
 - [REDACTED]
 - Action Item: Mike G. to put all GMWear Test Reports on the shared GM/Afton SharePoint site
 - Randy commented that water tolerance is something all transmission frictional systems must deal with and we should understand that ahead of time.
- Contamination Analytical Update - Paul Horvath informed the group [REDACTED]
- Action Item: Mike G. to send Paul Horvath a separate set of FTIR standards for Option B fluid as back-up
- GM Validation Plan for Option B:
 - TEDD Test - Max will have an update next week on re-test plans. Originally GM had planned to run 4 tests with different materials.
 - Key validation tests include foaming/aeration, elastomer compatibility (1008 hr test to start next week), torque converter testing, BorgWarner shifting clutch test, shaft durability test, Bearing test, Denso verification testing (o-ring durability starts mid-October)
 - We inquired as to GM's confidence in Option B in the validation testing. GM responded "it's like free beer" and added that Bill Goodrich, Chief engineer, has a pretty high level of confidence. The key test appears to be the BorgWarner test for clutch holding capacity.
- Afton confirmed that we are completing the Dexron HP licensing testing with data review planned for end of August 2016.
 - The GMW 16794 Dexron HP specification has all the test that will be run
 - ACTION ITEM: Mike G. to send Max a spreadsheet listing out these tests and limits.
- Darryl's Surface Analysis presentation was well received by GM
 - More surface debris on cut grooves
 - GM commented that frictional curves with cut grooves appear much better than those with pressed grooves.
 - GM will speak with BorgWarner about improving the consistency of those.
- Our next meeting will be July 28 at 2PM using Chris Cleveland's WebEx number

Please let me know if you have any questions or needed revisions/additions to the notes.

Regards,
Dan

**Exhibit
PX 237**

EXHIBIT 35

2017-2018 MST 8L45 Converter shudder after oil breakpoint

Issue:

8L45 MST has excessive claims /customer complaints for shudder after oil breakpoint of January 2017. (963+ claims)

Champion:

C. Bulloch

Root Cause Analysis:

- Field Results Warranty analysis, ATF Sampling, and Testing strongly points to the root cause lying within the ATF's (Dexron HP) sensitivity to moisture being inhaled thru the corporate common vent system design via daily cycles of air temperature and humidity degrading the friction characteristics of the oil w/ samples having estimated range of water between 400 – 1200 ppm.
- Analytically, in contrasting MST and FST for the same amount of hysteresis, the MST is ~ twice as sensitive to shudder.
- Analytically, a minimum hysteresis value of (~12Nm) has been shown to be effective at mitigating shudder where water is < 500 ppm. Potential mitigation for low mileage warranty.
- Analytically, at 1000 ppm water, no reasonable level of hysteresis is effective at mitigating shudder.

Action Plan:	Responsible	RCD	ECD
Evaluate addition of higher mechanical hysteresis (17 & 25Nm) in torque converters, on N&V Dyno and on road.	A. Scheich	05Jan18	Complete
Evaluate addition of higher mechanical hysteresis in torque converter by Platform Team. Working with supplier to get additional test by the first week in January.	B. Mahnken	03Jan18	Complete
Additional High Hysteresis 17 & 25Nm torque converters not available for MY19 platform buyoff rides	A. Scheich	19Jan18	Complete
Evaluate addition of higher mechanical hysteresis with WoWATF. <i>Original experiments conducted with water doping did NOT yield repeatable results so this was re-</i>	S. Look	31Jan18	Complete
Cost and Timing Engineering Estimate from supplier for High Hysteresis Package targeted nominal of 19+/-6 Nm.	D. Cashatt	8Jan18	Complete
Implementation of higher hysteresis package – incremental improvement EWO 2803032, KNYL (Target SPPAP MST 15Apr2018) est. 50 builds	C. Bulloch	15Apr2018	
New ATF (GTL) being investigated for service	K. Bennett	TBD	
Plan to accelerate production implementation of new ATF (GTL Mod. 2) prior to MY20	M. Burgman	TBD	

☐ Help Needed☐ Decision Needed☒ Information☐ Lesson Learned

Specific Request:

PRTS+: 1949473

PRTS Severity Code: 2

Date Last Modified: 9Jan17

**Exhibit
PX 179**

2017-2019 MST 8L45 Converter shudder w/ Option B

Issue:

8L45 MST has excessive claims /customer complaints for shudder after oil breakpoint of January 2017 and Hysteresis Implementation

Champion:

New 10thJan2019**C. Bulloch**

Root Cause Analysis:

- Field Results Warranty analysis, ATF Sampling, and Testing strongly points to the root cause lying within the ATF's (Dexron HP) sensitivity to moisture being inhaled thru the corporate common vent system design via daily cycles of air temperature and humidity degrading the friction characteristics of the oil w/ samples having estimated range of water between 400 - 1200 ppm.
- Analytically, in contrasting MST and FST for the same amount of hysteresis, the MST is ~ twice as sensitive to shudder.
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- Analytically, at 1000 ppm water, no reasonable level of hysteresis is effective at mitigating shudder.

Action Plan:	Responsible	RCD	ECD
Implementation of higher hysteresis package – incremental improvement EW0 2803032, KNBYL (Target SPPAP MST 15Apr2018) est. 30 builds	D. Cashatt	15Apr2018	Complete
New ATF (GTL) being investigated for service	M. Burgman	15Jan2019	
Plan to accelerate production implementation of new ATF (GTL Mod. 1a) prior to MY20	M. Burgman	Jan2019 (Exact Dates?)	

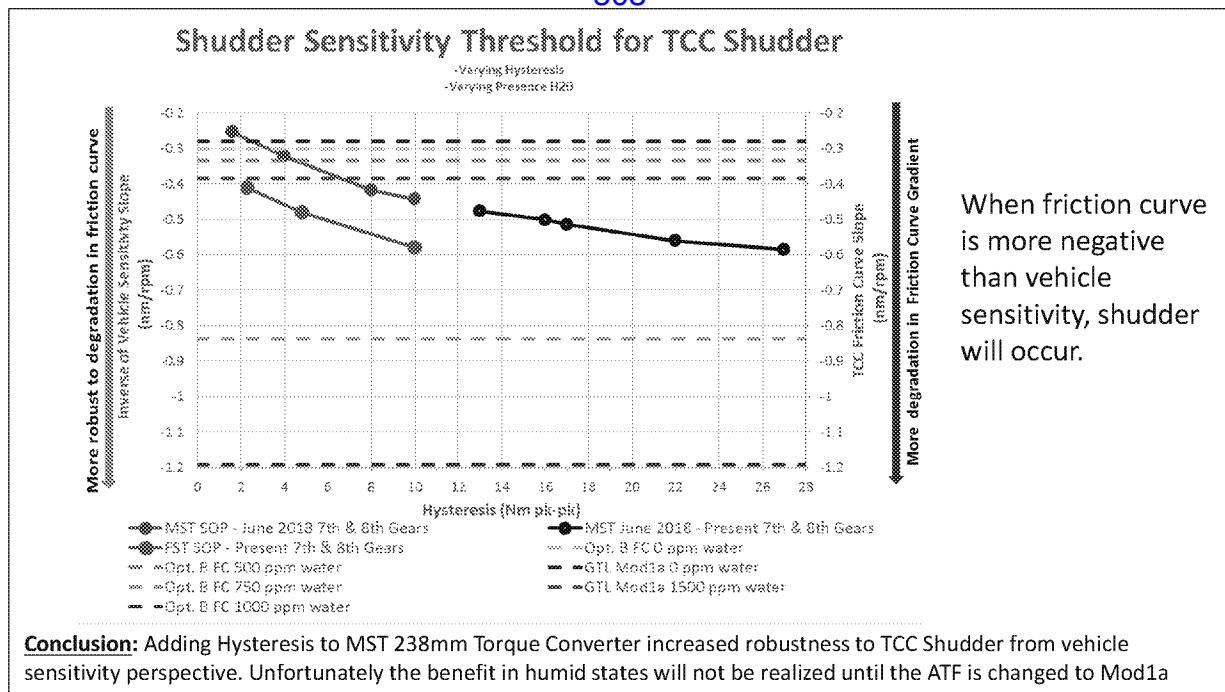
☐ Help Needed☐ Decision Needed☒ Information☐ Lesson Learned

Specific Request:

PRTS+:

PRTS Severity Code:

Date Last Modified: 9Jan17



WHY DIDN'T OPTION B VALIDATION/VERIFICATION CATCH WATER SENSITIVITY?

4

Customer Duty Cycle vs. Standard Roush Verification

- Option B ATF sampling from Roush vehicles would return results of 0 ppm of water versus Florida shudder warranty complaint Vehicles measuring 400 – 1200 ppm of water. Florida is where majority of complaints reside.
- Significant differences in drive cycle observed between Roush Duty Cycle and Onstar Smart Driver Sampling of shudder complaint customers.
 - GM's traditional Roush Duty Cycle aims at accelerated mileage accumulation.
 - 1-2 trips, with an average of 350 miles per trip. This leads to limited transmission thermal cycling.
 - TCC Shudder Customer's Duty Cycles Observed.
 - 4-12 trips, with an average of 16 miles per trip. This leads to potentially a lot more thermal cycling.
- Thermal Cycling is important as the transmissions cools, condensation in the air is ingested thru the vent tube and as it heats up, the moisture is evaporated.
- Several water fording tests at Milford, as well as customer feedback verified car washes and/or flooding not root cause of water measured in ATF samples.
- Roush Florida runs both testing for GM as well as Fiat-Chrysler, and we learned that Fiat-Chrysler ran a duty cycle more like what our customer data represents. That is 30 minute drive cycles with 4-6 hours of vehicles parked outside to take advantage of the environmental effects (high humidity) of the region on the vehicle's sub-systems with more thermal cycles.

Updated
10/JAN/19

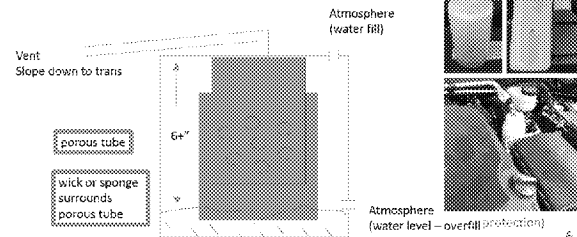
Vehicle Water Sensitivity (Humidity Catch Bottle)

Normal Sump Temps

ATF	# of Drive Cycles	Comment
Dexron HP 212B	12	SPHET244 238mm/WFP6300
Dexron Option B	20	SPHET244 238mm/WFP6300
GTL Mod1a	On-Going 79+	TPHET506 238mm/WFP6300

- Development Test created at Milford by Shawn Look to try replicate Florida Customers (high temperature) via vent placed under hood and wet sponge apparatus to simulate (high humidity)

Conclusion: Still trying to find if there's a point of saturation which creates an issue for GTL Mod1a. From a status perspective it appears that we're at least 4 times more robust than Option B.



BACKUP

7

Issue Title: MY2015-2019 8spd RWD Shudder (8145/90) Responsible Function(s): GM Engineering Responsible SMT(s): Transmission SMT Read Across for actions taken by Transmission SMT: PRTS: 1980184		Approx. 75,000 claims Totaling over [REDACTED] as of 26Sept2018																												
Condition: Shudder felt in vehicle during transient (tip-in/shift) and steady state maneuvers. Severity rating of GMUTS 3-5 Labor Codes 8464810, 8480518, and 8480478.																														
Systemic Root Cause: Friction performance of DEXRON HP ATF was significantly degraded by water contamination. Torque Converter Clutch (TCC) friction system performance is dependent on geometry, ATF, contamination, friction material, and reaction surface condition. Powertrain and vehicle architecture impact how the vibration is transmitted and perceived by the driver. TCC friction system, including formulation of DEXRON HP ATF, was not optimized for TCC specific friction slope performance req.																														
Specific Learning: <ul style="list-style-type: none"> Technical solution is to implement an ATF with a positive friction curve and low sensitivity to water contamination. ATF contamination by water adsorption was not included as a required performance parameter for 212B or Option B. Torque converter DFMEA did not include ATF contamination as a failure mode. Development of the DEXRON HP (212B) ATF did not adequately incorporate requirements for TCC performance. The TCC ADV incorporates hardware inputs but pass/fail criteria did not fully comprehend vehicle system requirements Increased Damping needed for the MST 8L45 (Hysteresis in the form of Belleville Spring was solution chosen). 																														
Quality Chain Impact: <table border="1" style="width: 100%; border-collapse: collapse; font-size: 0.8em;"> <thead> <tr> <th>Requirements (VTS / SSTs / CTS)</th> <th>Math Data</th> <th>ICD</th> <th>System FMEA</th> <th>Baseline DFMEA</th> <th>DFMEA</th> <th>DRBFM</th> <th>Baseline PFMEA</th> <th>PFMEA</th> <th>KCDS</th> <th>PROC / TOOL</th> <th>DV / PV TEST</th> <th>APQP / PPAP</th> <th>BEST PR.</th> </tr> </thead> <tbody> <tr> <td colspan="14"> <ul style="list-style-type: none"> ATF Performance Specification Template created for future fluids which includes 3 Day Wear w/ 1000ppm water and pass/fail criteria. (Oct 2018) TCC SOR, BOD, and ADV plan templates updated to include friction slope req. based on driveline modeling as well as water contamination testing. (Oct 2018) Read across - risk assessment for shudder in all transmission programs. (Apr. 2017) Starting Devices Integration DFMEA updated to include shudder and contamination testing requirements. (Oct 2018) Expected Breakpoint for GTL Mod1a ATF interim 2019MY / 95% IPTV reduction expected. TOV Target added to PSTs for shudder. <i>M. Foulkes leading activity to get N&V SSTs Stakeholders buy-in.</i> </td> </tr> </tbody> </table>			Requirements (VTS / SSTs / CTS)	Math Data	ICD	System FMEA	Baseline DFMEA	DFMEA	DRBFM	Baseline PFMEA	PFMEA	KCDS	PROC / TOOL	DV / PV TEST	APQP / PPAP	BEST PR.	<ul style="list-style-type: none"> ATF Performance Specification Template created for future fluids which includes 3 Day Wear w/ 1000ppm water and pass/fail criteria. (Oct 2018) TCC SOR, BOD, and ADV plan templates updated to include friction slope req. based on driveline modeling as well as water contamination testing. (Oct 2018) Read across - risk assessment for shudder in all transmission programs. (Apr. 2017) Starting Devices Integration DFMEA updated to include shudder and contamination testing requirements. (Oct 2018) Expected Breakpoint for GTL Mod1a ATF interim 2019MY / 95% IPTV reduction expected. TOV Target added to PSTs for shudder. <i>M. Foulkes leading activity to get N&V SSTs Stakeholders buy-in.</i> 													
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negative $\mu-v$ slope

DOE Blend 1 Effect of water
01/16/17, 69%, 6.42 MPa

Option B Production 12% Ester

negative $\mu-v$ slope

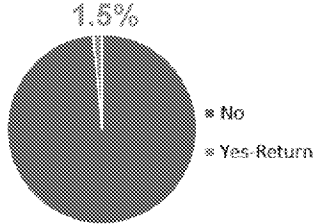
DOE Blend 10 Effect of water
01/16/17, 69%, 6.42 MPa

Option B w/ 1% Ester - Ref. 12% Ester

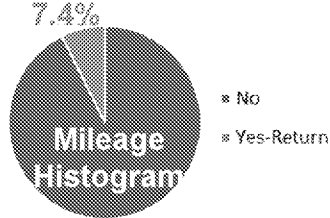
8-spd Shudder – SERVICE PROCEDURE & REPEAT CUSTOMERS

Percent Repeat Customers
Global Claims MY15-18

Return < 500 Miles



Return > 500 Miles



- Two current 8-spd service procedures - 16-NA-175 (8L90) and 18-NA-177 (8L45)
- Confirm TCC shudder based on operating condition and application specific criteria
 - Shudder service procedure detail
- Service procedure (8L90) – single drain and fill (per repair)
 - Remove transmission oil pan, filter, and drain fluid
 - Clean components and clear cooler lines with compressed air
 - Reassemble and refill
 - Do not re-evaluate vehicle before 200 miles and at least two cold/hot cycles
 - Repeats come back and may get TC replace
- Service procedure for the 8L45 is the same as above except: (per repair)
 - Replace converter with hysteresis converter
 - No mention of re-evaluation after 200 miles
- 0% glazed friction material found (~100 parts)

9

EXHIBIT 36

Message

From: Randy L. Melanson [/O=GM/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=D9A7A37C26F5454EBA951042EE05399E-FZH6R6]
Sent: 4/19/2018 12:53:17 PM
To: Daniel J. Smith [daniel.j.smith@gm.com]
Subject: RE: Oil

Thanks. Sounds like we're on the same page.....

From: Daniel J. Smith
Sent: Wednesday, April 18, 2018 3:42 PM
To: Randy L. Melanson <randy.l.melanson@gm.com>
Subject: RE: Oil

I agree with everything you said. That is helpful to know that changes have been made to the ADV toolbox. I was going to suggest that we need system level anti-shudder testing.

From: Randy L. Melanson
Sent: Wednesday, April 18, 2018 2:43 PM
To: Daniel J. Smith <daniel.j.smith@gm.com>
Subject: RE: Oil

About the only thing I might re-word is the TCC friction system/oil being one source of negative damping. More precisely, the entire GF9 driveline trans/vehicle is underdamped, which makes the driveline susceptible to TCC shudder from a negatively sloped TCC friction curve. By contrast, GF6 applications do not shudder w/ a negatively sloped friction curve (MS022/Dex VI in every single transmission we make) because GF6 trans/vehicle systems have net positive damping, and remain net positive even with a negatively sloped TCC friction system.

So just having a negatively sloped TCC friction system does not mean a system will shudder. The only options to make these sensitive drivelines robust against shudder is to a) make the vehicle architecture less sensitive by adding damping (good luck with that one), b) make the transmission less sensitive by adding damping e.g. increase spin/frictional losses, reduce OAR steps/spreads, including lowering axle ratios (good luck with that one, severe FE impact), or c) make the TCC friction system more robust against shudder w/ softer ATF (more positively sloped).

From a converter validation standpoint, we have already revised our pass/fail criteria for a new friction system (either/both ATF and friction material), and it is reflected in our ADV toolbox as a positive mu-v curve (> 0). Kelly forced us into it, and we in converter world are all good with it, but we receive relentless pushback from vertical product teams due to lack of understanding (or lack of will). We have even added bench testing for water sensitivity. But no one is talking about any system level validation changes to confirm anti-shudder robustness in the trans/vehicle system. That is owned by someone other than the converter group.....

Hope this helps, good luck in the CPIT, and let me know if you ever want to talk.....

From: Daniel J. Smith
Sent: Wednesday, April 18, 2018 2:15 PM
To: Randy L. Melanson <randy.l.melanson@gm.com>
Subject: RE: Oil

Exhibit
0108

Well..... I would like to discuss. But this very topic will be discussed at the Sector CPIT tomorrow morning. I am doing a short report on GF9 shudder. At the end I am going to conclude by saying that we have a very sensitive system to driveline shudder on GF9. Our TCC friction system/oil is one source of negative damping that can contribute to shudder. We have found that alternate fluids with more positive slope give us more robustness to the shudder. I will also state that our fluid validation did not identify this issue and this needs to be discussed.

From: Randy L. Melanson
Sent: Wednesday, April 18, 2018 1:53 PM
To: Daniel J. Smith <daniel.j.smith@gm.com>
Subject: RE: Oil

Dan,
Some questions are better left unsaid.....

It would take a while to fully answer your questions. Suffice it to say we noticed something wrong with both fluids (but mostly 212B) back in early 2013 on bench testing. By summer 2013, pre-production C5 8-speed corvettes were shuddering w/ 212B/Luk WFP6300 material. We recommended a 5% softer fluid, tried it in vehicle, found it reduced shudder amplitude, but didn't clean kill it. Recommended going further to a 10% softer fluid (where Option B is today), but Bill was reluctant to put it in vehicle because of fear of slipping the shifting clutches. They ended up escaping the corvette issue w/ a cal change. When I challenged him (in a lengthy, back and forth email chain) that high volume 8-speed trucks would still be at risk and we needed to fix the oil, he refused to even discuss the issue w/ Larry Diemer, we went into production w/ 212B in 2015 trucks, and to this day are still bleeding shudder warranty to the tune of ~ [REDACTED]/month.....

If you'd like, we could discuss over a cup of coffee, but the details are sordid, and we'd need to make sure we're not being surveilled.....I'm available most of the day tomorrow, if you'd like. Just let me know.

Thanks,
Randy

From: Daniel J. Smith
Sent: Wednesday, April 18, 2018 1:33 PM
To: Randy L. Melanson <randy.l.melanson@gm.com>
Subject: RE: Oil

Randy,

Thanks for this info. I agree.

Question: What are we doing wrong with our fluid/friction system validation that we did not identify that 212B & Dex VI had insufficient FM, and 212B/Option B had sensitivity to water?

Dan

From: Randy L. Melanson
Sent: Wednesday, April 18, 2018 10:02 AM
To: Maxim Burgman <max.burgman@gm.com>; Peter Radecki <peter.radecki@gm.com>; Andrew Scheich <andrew.scheich@gm.com>
Cc: Tim Anguish <tim.anguish@gm.com>; Robert J. Gonzales <robert.j.gonzales@gm.com>; Nathan Siebert

<nathan.siebert@gm.com>; Daniel J. Smith <daniel.j.smith@gm.com>; Bernie Kranz <bernie.kranz@gm.com>; Shawn B. Look <shawn.b.look@gm.com>

Subject: RE: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

Max and Peter, I think you're both right. And I'm not just handing out participation trophies here. On 8-speed, original 212B does not need water to shudder, it will do that very nicely on its own, thanks to insufficient friction modifiers designed into the additive package. If we had a sealed trans and no water contamination, we would still see shudder developing at ~ 20-40k miles, and eventually they'd all pop, given enough time. Since our trans is not sealed, water simply accelerates the friction curve degradation depending on how much and how fast net accumulation occurs. In summary, it's the combination of a poorly designed FM package and PAO fluid sensitivity to water (from high ester levels) that is behind the huge shudder IPTV we're seeing in 2015-2017 MY's.

The fact that 8L90 FST warranty with Option B has improved compared to 212B seems to suggest this, i.e. that Option B "without water" has improved, or at least slowed the rate of friction curve degradation @ mileage inherent with 212B in these apps. Perhaps it is because of the FST higher operating sump temps vs MST that slows the rate of net water accumulation, in addition to the significantly large positive slope of Option B that gets better with mileage. But we cannot make the same comparison on MST, since Option B is the only ATF it has ever known, the new vehicle architecture being more sensitive to negative slopes vs FST, and it runs cooler sumps which may hasten friction curve demise. In this case, it wouldn't be a stretch to say that most, if not all Option B shudder cases are due to water, both in FST and MST. There is simply too much FM's in the additive package for shudder to occur at < 12-24 MIS without water being the culprit; wrt Option B, Peter is correct.

So all Option B shudder cases are more than likely because of water contamination, while 212B shudder is a mixture of water and non-water friction degradation (although water is undoubtedly the bigger of the two causes). Hope this makes sense; trophies can also be made available upon request (stale candy bars anyone?).

Dan and Bernie, please note: wrt Dex VI, although it does not seem to be sensitive to water (good news), it does not have sufficient friction modifiers (bad news) to keep the TCC friction system from degrading into shudder in a sensitive vehicle driveline like the C1xx GF9 (i.e. inadequate positive system-level damping). The Dex VI additive package is essentially the same as 212B from a friction modifier standpoint, and is not robust enough to keep us out of the ditch. Maybe a better friction material may help the numbers, but it's all about the oil.....just sayin.

From: Maxim Burgman

Sent: Wednesday, April 18, 2018 1:27 AM

To: Peter Radecki <peter.radecki@gm.com>; Andrew Scheich <andrew.scheich@gm.com>

Cc: Randy L. Melanson <randy.l.melanson@gm.com>; Tim Anguish <tim.anguish@gm.com>; Robert J. Gonzales <robert.j.gonzales@gm.com>; Nathan Siebert <nathan.siebert@gm.com>; Daniel J. Smith <daniel.j.smith@gm.com>; Bernie Kranz <bernie.kranz@gm.com>; Shawn B. Look <shawn.b.look@gm.com>

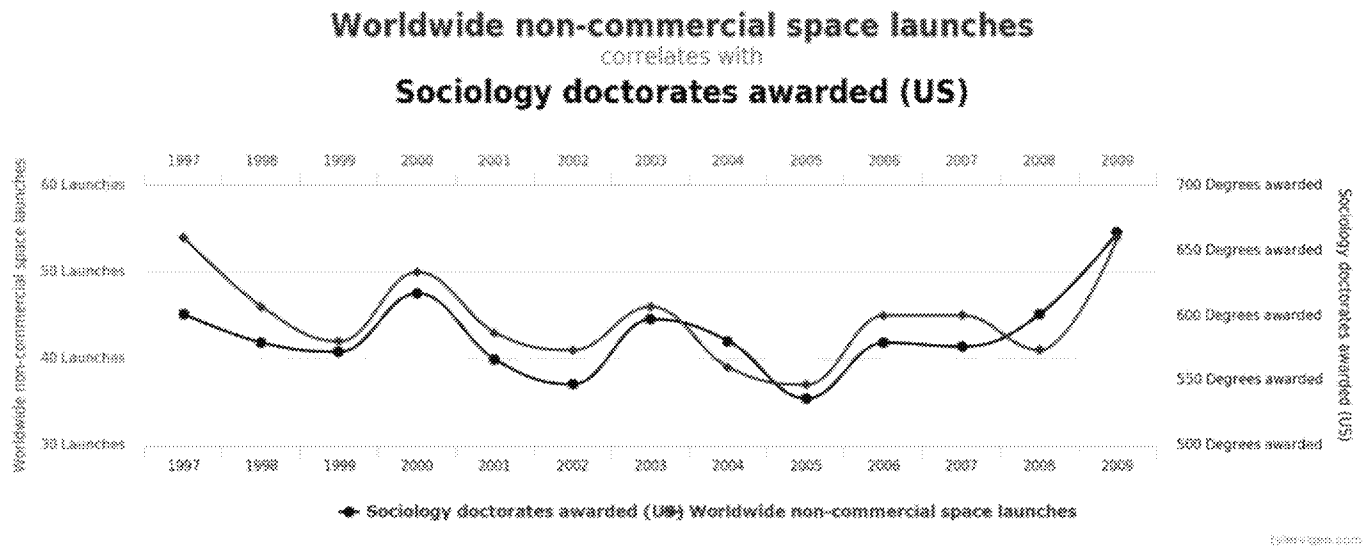
Subject: Re: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

Hi Peter,

I have much respect the work you've done.

We've shown that water can induce shudder, that shudder warranty rates can fluctuate with humidity, but we've not shown that every transmission that shuddered has had water in it.

While the exercise may be academic at this point, until we kill shudder warranty entirely with an ATF change, this is what the flat earthers will have in their minds but won't say publicly:



(<http://www.tylervigen.com/spurious-correlations>)

Again, not disagreeing with you, just presenting a possible way of supporting your argument (and maybe poking at you in the process, just a little).

I guess I just wanted some oil and filter samples for my pet project (have no idea if this will even work) and thought you guys would think it's cool since we have been trying for a long time to find a way to measure historical water in oil.

Sincerely,

Max

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From: Peter Radecki <peter.radecki@gm.com>

Sent: Tuesday, April 17, 2018 11:58 PM

Subject: RE: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

To: Maxim Burgman <max.burgman@gm.com>, Andrew Scheich <andrew.scheich@gm.com>

Cc: Randy L. Melanson <randy.l.melanson@gm.com>, Tim Anguish <tim.anguish@gm.com>, Robert J. Gonzales <robert.j.gonzales@gm.com>, Nathan Siebert <nathan.siebert@gm.com>, Daniel J. Smith <daniel.j.smith@gm.com>, Bernie Kranz <bernie.kranz@gm.com>, Shawn B. Look <shawn.b.look@gm.com>

Max,

The fact that flat earth societies still exist: https://en.wikipedia.org/wiki/Modern_flat_Earth_societies has me skeptical at this stage of the game whether some folks from trans leadership will ever understand that the root cause holds water (pun intended) regardless of the amount of data and evidence collected.

Glad you found the paper and shared it. However, not trying to throw stones here, but this sort of investigation should have been run by RedX or the fluids group 2 years ago when we discovered all of the water sensitivities in spring 2016. At this point we are most of the way through validating GTL Mod2 and have some confidence on its robustness to 8-spd shudder root cause: humidity. The second half of your statement "*We've shown that water can cause shudder, not that it is the cause of shudder (writ large) in the field.*" is false. Seasonal, geographical, and repeat warranty trends were clear and obvious proof of root cause half a year ago, holdouts should study paragraph number 1 above.

Thursday I can check my MPG locker for ATF samples; I believe we had a number from several of the early WoW returns. I'll get you whatever I have, might as well run them.

Looking to the future it would behoove us to send/analyze samples from bad shifting warranty return transes and shuddering transes as new problems develop. We should also get baselines for our various transes and ATF's using this plus whatever other newer methods have been developed in the decade since this paper was published. For example, send samples from EOT Roush 100k mile vehicles to get a wear model of typical Friction Modifier depletion rates, typical humidity ingestions, etc. from multiple geographical areas in the US. Then we'd have a real handle on the trans ATF lifecycle and have developed the technical capability to formally dive into the ATF when new problems like this arise.

Thanks,
Peter

Peter Radecki, Ph.D.
Transmission Development Engineer
GM Powertrain
peter.radecki@gm.com
C 248.828.5864



From: Maxim Burgman
Sent: Tuesday, April 17, 2018 9:10 PM
To: Andrew Scheich <andrew.scheich@gm.com>
Cc: Randy L. Melanson <randy.l.melanson@gm.com>; Peter Radecki <peter.radecki@gm.com>; Tim Anguish <tim.anguish@gm.com>; Robert J. Gonzales <robert.j.gonzales@gm.com>; Nathan Siebert <nathan.siebert@gm.com>; Daniel J. Smith <daniel.j.smith@gm.com>; Bernie Kranz <bernie.kranz@gm.com>; Shawn B. Look <shawn.b.look@gm.com>
Subject: Re: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

Hi Andrew,

Whenever an email starts out with 'what a creative idea, but...' you kinda know what's coming next.

Just to be clear, this method can detect historical even water when Karl Fischer shows no water present in the oil sample.

We've shown that water can cause shudder, not that it is the cause of shudder (writ large) in the field. A true BOB/WOW split based on historical water will convince the holdouts.

I fully understand if we're exhausted and the appetite is not there for 8 speed work...but could be a quick and easy win if it pans out.

Sincerely,

Max

Get Outlook for iOS

From: Andrew Scheich <andrew.scheich@gm.com>

Sent: Tuesday, April 17, 2018 5:43 PM

Subject: RE: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

To: Maxim Burgman <max.burgman@gm.com>

Cc: Randy L. Melanson <randy.l.melanson@gm.com>, Peter Radecki <peter.radecki@gm.com>, Tim Anguish <tim.anguish@gm.com>, Robert J. Gonzales <robert.j.gonzales@gm.com>, Nathan Siebert <nathan.siebert@gm.com>, Daniel J. Smith <daniel.j.smith@gm.com>, Bernie Kranz <bernie.kranz@gm.com>, Shawn B. Look <shawn.b.look@gm.com>

Max,

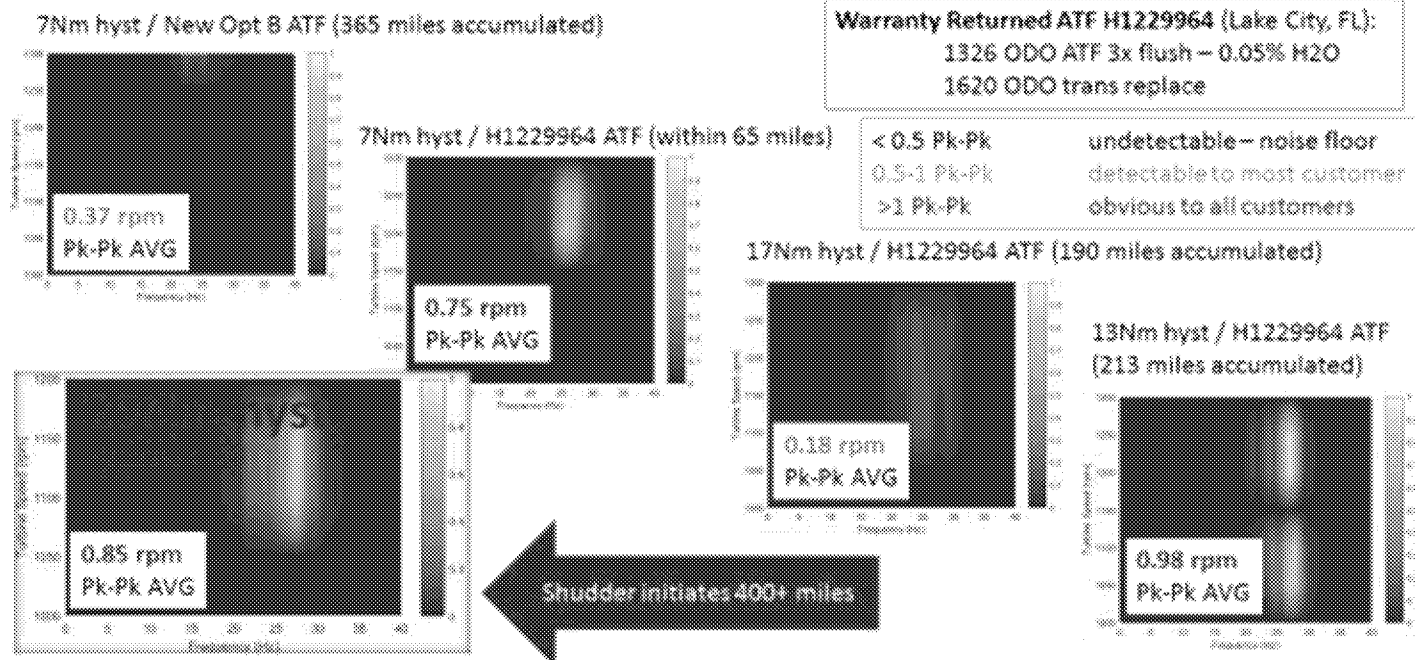
- I like the creative thinking and it's an interesting idea.
- I guess where I'm struggling with the type of analysis in the context of the 8spd transmission and Afton 212B and Option B ATF's:

CONCLUSIONS

The failure to detect water in an oil sample does not mean the oil was always water-free. In cases where the

We know our ATF is sensitive to water by both vehicle testing (Torque Converter Clutch and Shifting Clutches) and the bench 3 day wear testing at levels of 1000 ppm of water and our ATF samples from the field measure water. In summary the gun has smoked multiple times already, but our leadership has failed to recognize this...

MPG Vehicle testing TPHET506 (Pk-Pk turbine speed)



Conclusion: Hysteresis improvement has little effect on shudder suppression in mid size truck when Option B ATF is contaminated w/ H2O and break-in mileage accumulated.

- If you wanted to explore something like this for Dex. 6 in GF9 I could see the potential benefit. Also we might be able to catch a few WoW transmissions from Bernie to collect ATF and transmission filter before installed in vehicle with new ATF for evaluation.

Thanks,

Andrew Scheich

Torque Converter Integration

Tel:248.880.5122

Andrew.Scheich@gm.com

From: Maxim Burgman

Sent: Tuesday, April 17, 2018 4:41 PM

To: Daniel J. Smith <daniel.j.smith@gm.com>

Cc: Randy L. Melanson <randy.l.melanson@gm.com>; Andrew Scheich <andrew.scheich@gm.com>; Peter Radecki <peter.radecki@gm.com>; Tim Anguish <tim.anguish@gm.com>

Subject: RE: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

Hi Dan,

If you scroll down, I have cost information from Trico – a company that does oil analysis for a living—and it's about 60 to 70 bucks a sample. The author of the paper, Tim Newcomb, now works for Lubrizol and he said good things about Trico.

BW still has this technique—my fear is that, unless they offer to do it for free, they'll quote us something ridiculous.

Sincerely,

Max Burgman

ATF Test Technical Specialist

GM Propulsion Systems

Cell: 734.552.9481

From: Daniel J. Smith

Sent: Tuesday, April 17, 2018 4:37 PM

To: Maxim Burgman <max.burgman@gm.com>

Cc: Randy L. Melanson <randy.l.melanson@gm.com>; Andrew Scheich <andrew.scheich@gm.com>; Peter Radecki <peter.radecki@gm.com>; Tim Anguish <tim.anguish@gm.com>

Subject: RE: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

This looks pretty interesting. How much does it cost? Since the guys from BW wrote the paper does that mean they have the ability to do the test?

From: Maxim Burgman

Sent: Tuesday, April 17, 2018 4:19 PM

To: Randy L. Melanson <randy.l.melanson@gm.com>; Andrew Scheich <andrew.scheich@gm.com>; Peter Radecki <peter.radecki@gm.com>; Tim Anguish <tim.anguish@gm.com>

Cc: Paul Harvath <paul.harvath@gm.com>; Kimberly Bennett <kimberly.bennett@gm.com>; Daniel J. Smith <daniel.j.smith@gm.com>

Subject: 8RWD shudder BOB/WOW samples. Re: FW: Analytical Ferrography and Filter Debris Analysis from a Transmission

Hi Gentlemen,

Analytical ferrography is a microscopic method to analyze wear particles, and specifically presents an opportunity to look for evidence of historical presence of water. This could be a smoking gun wrt the water ingress issue. We'd need trans filters from a few BOB and WOW vehicles (more likely to sample wear particles), as well as BOB/WOW oil samples—with the only catch here being that fluid samples should be taken shortly after circulating the fluid to capture the majority of wear particles, which might be a challenge.

The samples would have to be from vehicles with some mileage because it would take red oxide wear particles some time to form.

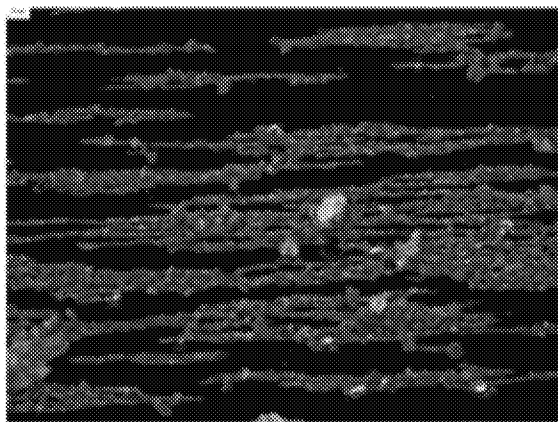


Figure 7. Darkfield image from a ferrogram made from transmission fluid showing red oxides of ~ 10 micron diameter. The white particles are abrasive oxides attributed to dirt ingress.

Further, it would show us another way of comparing differences between BOB/WOW wear patterns as a free benefit. Whaddaya think?

Sincerely,

Max Burgman

ATF Test Technical Specialist

GM Propulsion Systems

Cell: 734.552.9481

From: Ray Dalley [mailto:RDalley@tricocorp.com]

Sent: Tuesday, April 17, 2018 1:47 PM

To: Maxim Burgman <max.burgman@gm.com>

Cc: Russ Loede <RLoede@tricocorp.com>; Kemberlee Snelling <KSnelling@tricocorp.com>

Subject: [EXTERNAL] Analytical Ferrography and Filter Debris Analysis from a Transmission

Hello max,

A pleasure speaking with you this afternoon about Ferrography and Filter Debris Analysis. Per our conversation, the Filter Analysis (FIL-S) is \$70.00 per sample and the Analytical Ferrography plus other test (H002) is \$56.00 per sample. Attach are the necessary information to process your samples. Last, we would need about 4 fluid ounces for the Analytical Analysis.

Raymond Dalley | *Business Development*

Trico Corporation

P: 262-691-9336, ext. 830 | C: 216-406-3930

F: 262-691-2576 | www.tricocorp.com

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EXHIBIT 42

8 Speed RWD VPE Quality Update

Dec 19, 2016



Executive Summary: 8 Speed RWD Quality Status Update

Purpose:

Decision Requested

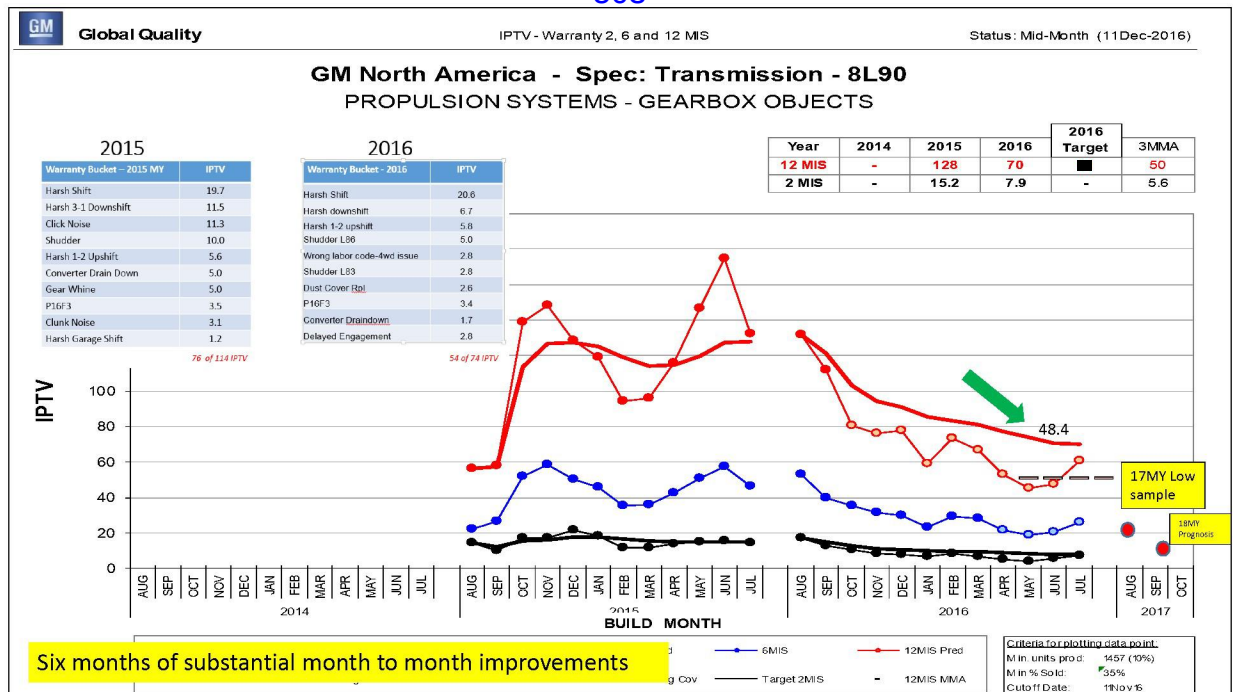
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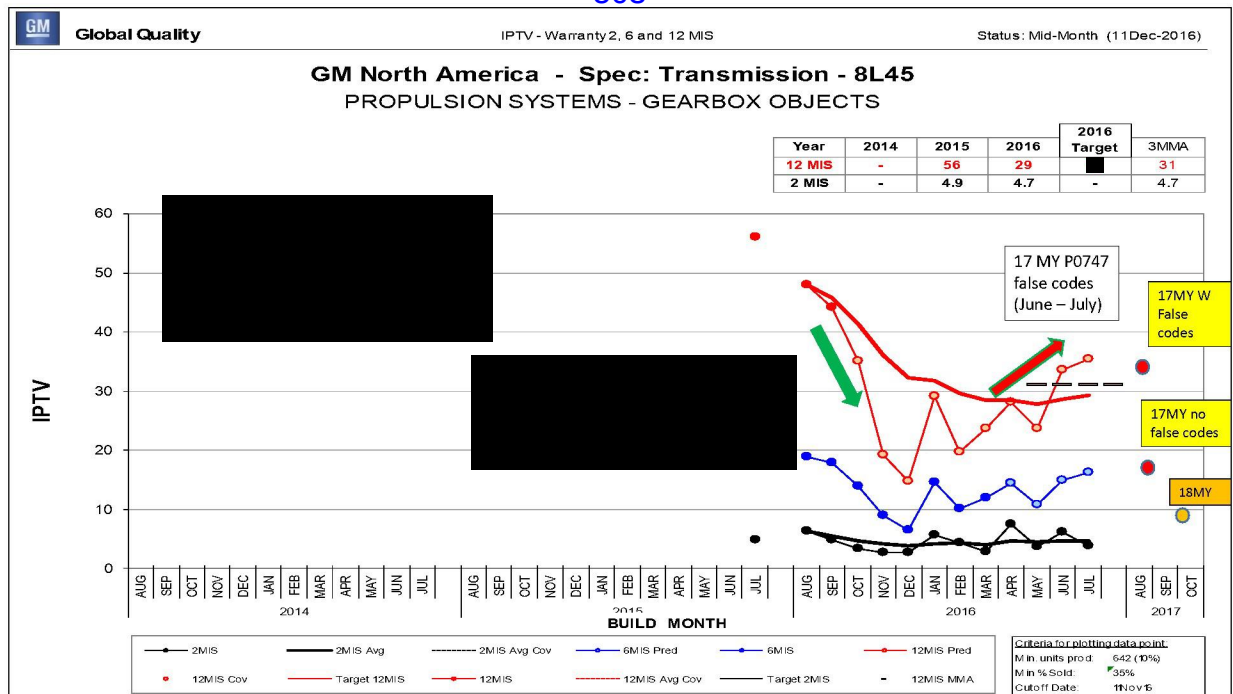
Discussion Only

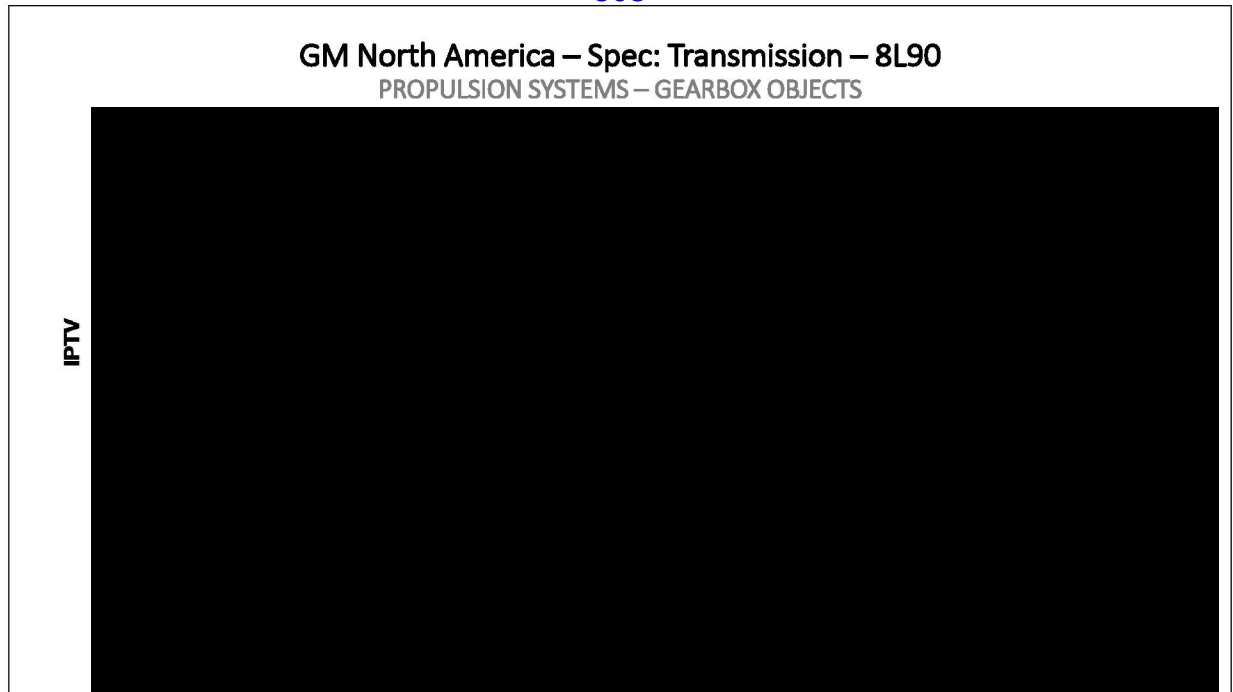
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Warranty









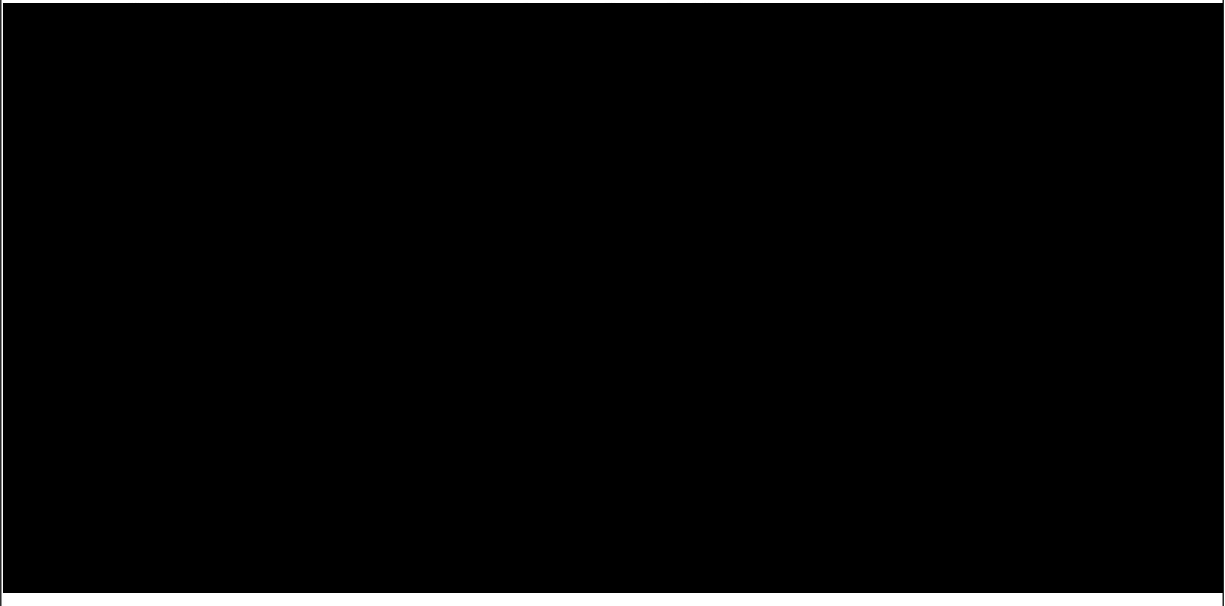
Key 8L90 Trans Issues

Issues

- Click Noise – Engineering (CLOSED)
- Gear Noise – Supplier spill (CLOSED with [REDACTED])
- Triple Clutch crack – Supplier spill (Contained)
- Shift quality due to converter seal – Engineering - Trans and converter seal (BP Dec 2015)
- General shifting quality – Engineering - calibration and hardware driven (BP 15MY SVC and 16MY (2))
- P2818/P16F3 – Engineering - codes causing trans replace (CLOSED)
- Converter Drain down – Engineering – Stator Support Check Ball (BP Dec 2015)
- Noise – Dust Cover Warping – Engineering – Material Change (CLOSED)
- Delayed Engagement – Engineering – Investigating
- Transmission Shudder – Engineering – Product and friction system robustness – Direction Established (TID January – February 2017)

Action item - Ensure all Major IPTV Drivers are Identified w/Owners
Should we include shudder as open?

8L90 15MY & 16MY FST, SUV Warranty Proposal



Update May 24

Shudder – 1% 10IPTV [REDACTED] per triple flush. [REDACTED] per TCC replacement.

15 MY 98,833 x 1% = 988 x [REDACTED] 16MY 139,374 x 1% = 1394

Update May 13

Click noise – 15% of 29,276 x \$ [REDACTED]

Gear whine closed

Converter drain down – 7% of 98,833 x [REDACTED] 6918 failures plus 7% of 34,774 x [REDACTED] 2434 failures

Harsh Shift – 33% of 98,833 x [REDACTED] 32,614 failures plus 13.5% of 139,374 = 18815 failures

Rev 3

7k x 7 weeks All FST, SUV and Cars. 4500 week FST and FSUV only.

Removed all car applications from both Converter drain down and harsh shifts. 15MY 98,833 FST and FSUV. 16MY FST and FSUV 107,874 plus 31,500 for remaining model year = 139,374. [REDACTED] Removed all car applications. Cost still based on straight volume calculation.

FST and SUV only. [REDACTED] cost. 15 MY 98,833 vehicles FST and SUV. 16 MY L86 only through Nov. MOB = 34,774 [REDACTED] Need to add cost numbers

For every TAC case, there are typically 10 others where the dealer did not call, sometimes do not always submit a warranty claim.

What is GM cost to replace a transmission @ dealer? Average cost \$ [REDACTED]. Depending on vehicle – can vary between \$ [REDACTED] and [REDACTED]

What is GM cost to flash TCM Cals @ dealer? Average cost is [REDACTED], varies between \$ [REDACTED]

What is GM cost to flash TCM Cals & SW @ dealer? Included in TCM reflash cost

What is GM cost to run SFL @ GM dealer? Included in TCM reflash cost

What is GM cost to run MY15 drive adapt @ GM? Average cost is \$ [REDACTED] varies between \$ [REDACTED]

What is GM cost to run MY16 drive adapt @ GM? Average cost is \$ [REDACTED], varies between \$ [REDACTED]

What is GM cost to flash ECM Cals @ dealer? Average cost is \$ [REDACTED]

What is GM cost to flash ECM Cals & SW @ dealer? Included in ECM reflash cost.

Reaction Carrier Replacment – average cost is [REDACTED] based on 2015 MY warranty claims.

TCC and Stator, TCM reflash – average cost [REDACTED] (shared labor, tcc parts cost, stator support and tcm/ecm reflash.

TCC and Fluid Flush - [REDACTED]

Drainback fix - replace stator shaft support assembly (Bulletin #16-NA-014 - Delayed engagement after sitting with engine off)

Approximate field cost [REDACTED] Parts, does not include trans fluid, shop costs, etc) Labor cost today is [REDACTED]

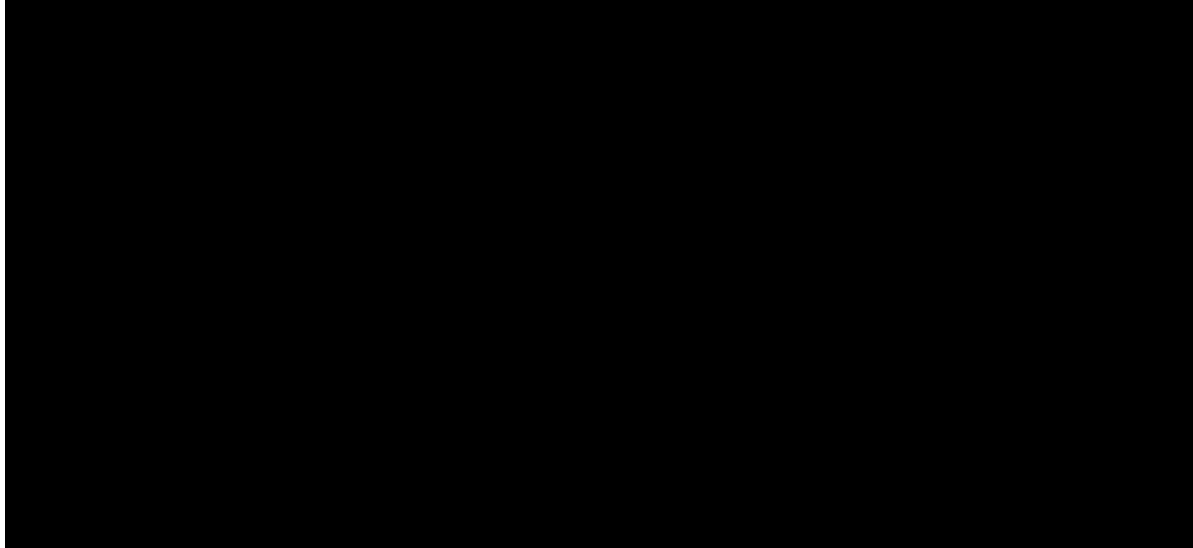
Torque converter replace (PIP5337B - Shake or shudder on acceleration excessive engine RPM fluctuation between 30-65 mph)

Approximate field cost - [REDACTED] - this number could vary a little based on particular converter being replaced)

Click noise fix (PI1450) - we are replacing trans for this currently (would have to revise the bulletin since current one instructs to replace trans for this condition)

Approximate field cost - [REDACTED] Parts, which includes overhaul kit and new 1278/12345 clutch plates)

8L90 15MY & 16MY Car Applications Warranty Proposal



May 13th

16% x 22,409 x [REDACTED] 3585 failures 5.5% x 29,595 1627 failures

385 x \$ [REDACTED]

Rev 2

7k x 7 weeks [REDACTED] Removed all car applications from converter draindown. Cost still based on straight volume calculation. FST and SUV only. [REDACTED] 15 MY 98,833 vehicles FST and SUV. 16 MY L86 only through Nov. MOB = 34,774 [REDACTED] Need to add cost numbers

For every TAC case, there are typically 10 others where the dealer did not call, sometimes do not always submit a warranty claim.

What is GM cost to replace a transmission @ dealer? Average cost [REDACTED] Depending on vehicle – can vary between [REDACTED]

What is GM cost to flash TCM Cals @ dealer? Average cost is [REDACTED]

What is GM cost to flash TCM Cals & SW @ dealer? Included in TCM reflash cost

What is GM cost to run SFL @ GM dealer? Included in TCM reflash cost

What is GM cost to run MY15 drive adapt @ GM? [REDACTED]

What is GM cost to run MY16 drive adapt @ GM? [REDACTED]

What is GM cost to flash ECM Cals @ dealer? [REDACTED]

[REDACTED] reflash cost.

Reaction Carrier Replacment – [REDACTED] based on 2015 MY warranty claims.

TCC and Stator, TCM reflash [REDACTED] (shared labor, tcc parts cost, stator support and tcm/ecm reflash.

TCC and Fluid Flush [REDACTED]

Drainback fix - replace stator shaft support assembly (Bulletin #16-NA-014 – Delayed engagement after sitting with engine off)

Approximate field cost - [REDACTED], does not include trans fluid, shop costs, etc) Labor cost today is about [REDACTED]

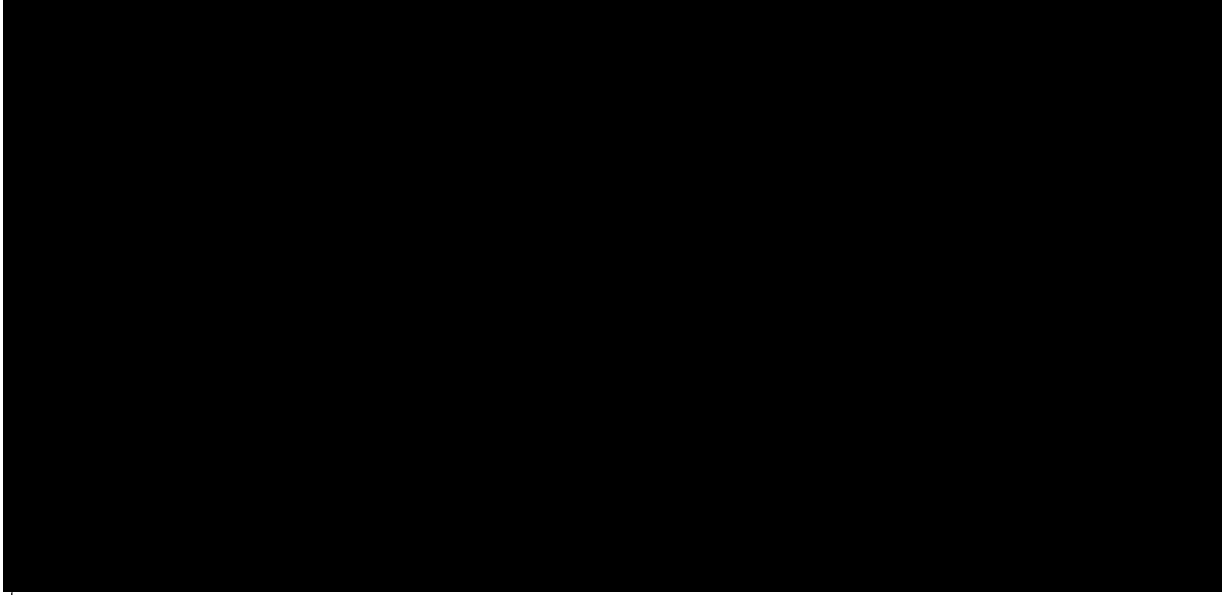
Torque converter replace (PIP5337B – Shake or shudder on acceleration excessive engine RPM fluctuation between 30-65 mph)

Approximate field cos [REDACTED] for torque converter – this number could vary a little based on particular converter being replaced)

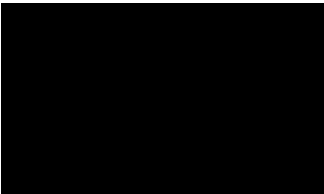
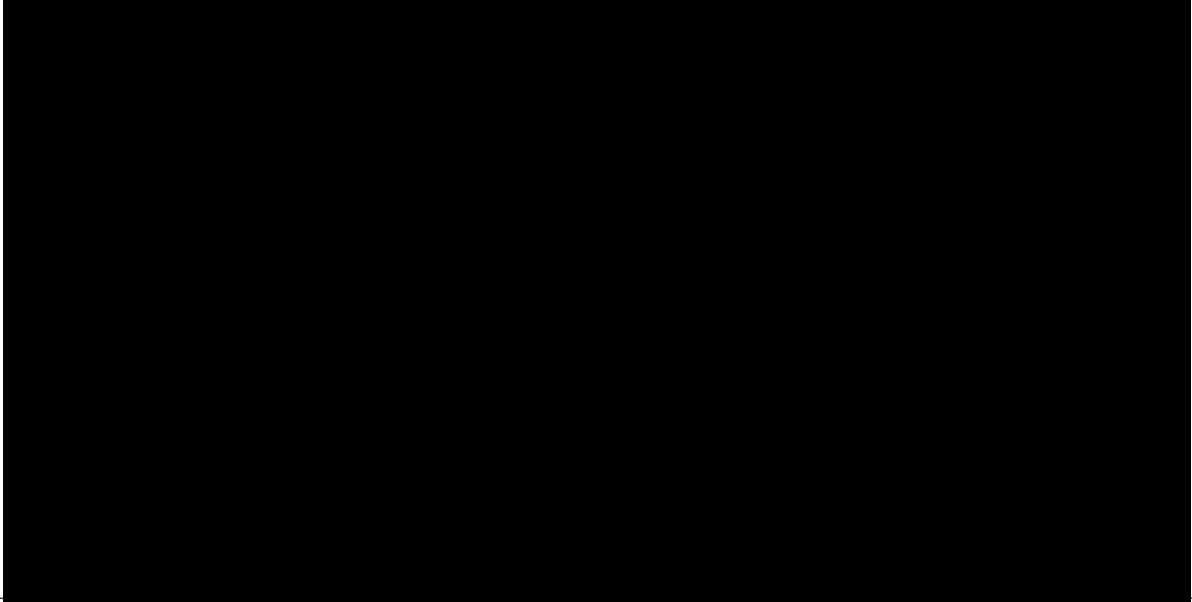
Click noise fix (PI1450) – we are replacing trans for this currently (would have to revise the bulletin since current one instructs to replace trans for this condition)

Approximate field cost - [REDACTED] Parts, which includes overhaul kit and new 1278/12345 clutch plates)

MY15/16 Truck/SUV PSEC Field Management Plan



MY16 Omega GPS Field Service Proposal



Omega Warranty Summary

8L45 w/LGX

- MY16 – 8.6 claims per thousand vehicles sold
- MY17 – 1.1 claims per thousand vehicles sold (would be 0.6 without the P0747 issue)

8L90 w/LGW

- MY16 – 25 claims per thousand vehicles sold
- MY17 – 16 claims per thousand vehicles sold (would be 8 without the P0747 issue)

MY17 has harsh shift complaints with both the L45 (1) and L90 (2) so a MY16 service package would not be free of issue. We do, however, appear to be better.

COMPASS



Compass – 8L90 FS Utilities

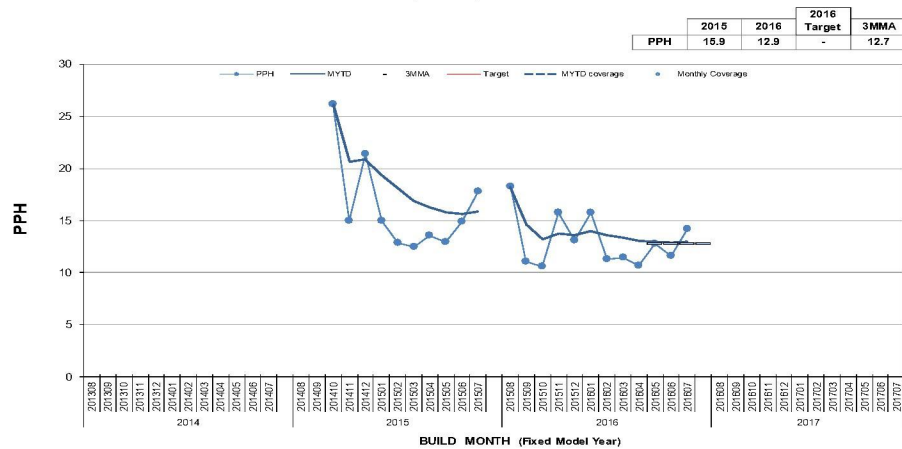


Global Quality

COMPASS

Compass Status: Dec 2016

K2 Utility , Vehicles Sold In: GM North America , Specification: Transmission - 8L90
SMT - Propulsion Systems - Trm



Minimum Sample: 50

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12/13/2016

Rebecca get presentation ready

Compass – 8L90 FS PUs



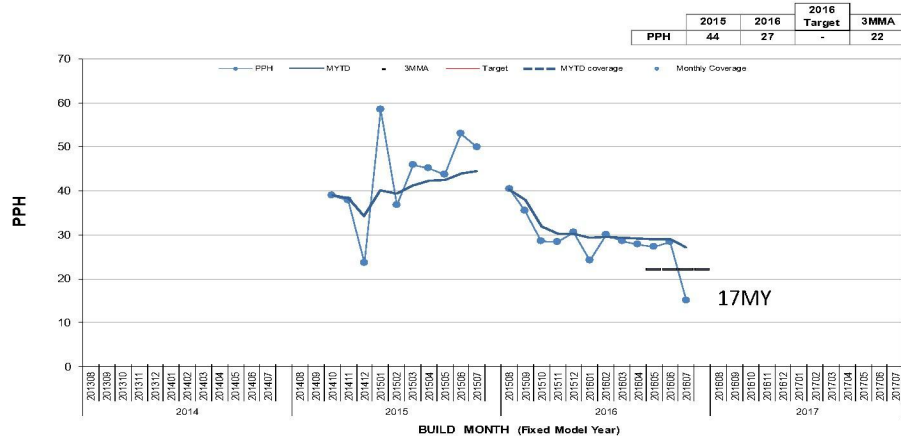
Global Quality

COMPASS

Compass Status: Dec 2016

K2 FST LD/HD , Vehicles Sold In: GM North America , Specification: Transmission - 8L90

SMT - Propulsion Systems - Trm



Minimum Sample: 50

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12/13/2016

Compass – 8L90 Corvette



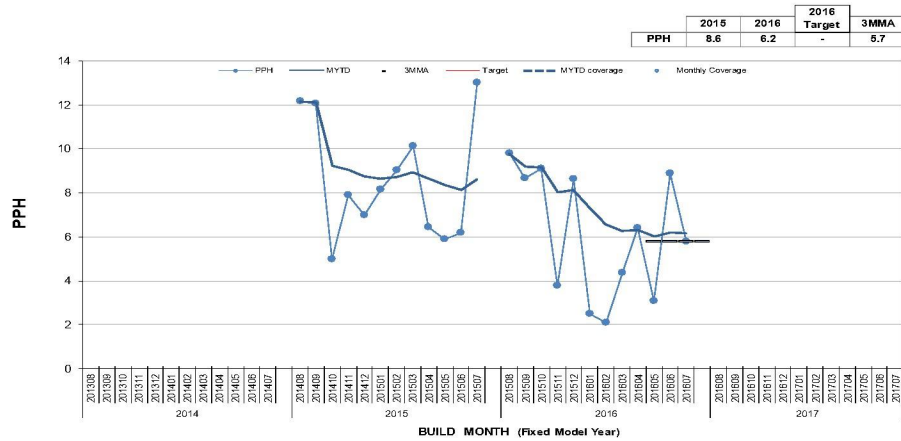
Global Quality

COMPASS

Compass Status: Dec 2016

Corvette , Vehicles Sold In: GM North America , Specification: Transmission - 8L90

SMT - Propulsion Systems - Trm



Minimum Sample: 50

GM Confidential

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12/13/2016

Compass – 8L45 (All)



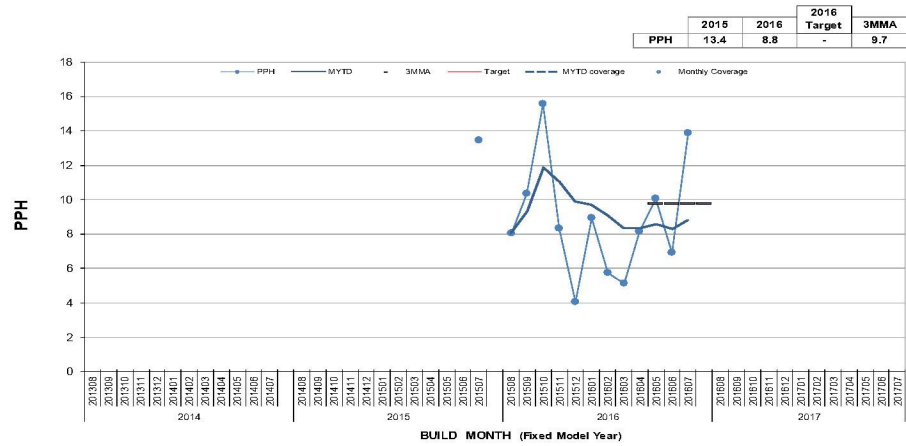
Global Quality

COMPASS

Compass Status: Dec 2016

Vehicles Sold In: GM North America , Specification: Transmission - 8L45

SMT - Propulsion Systems - Trm

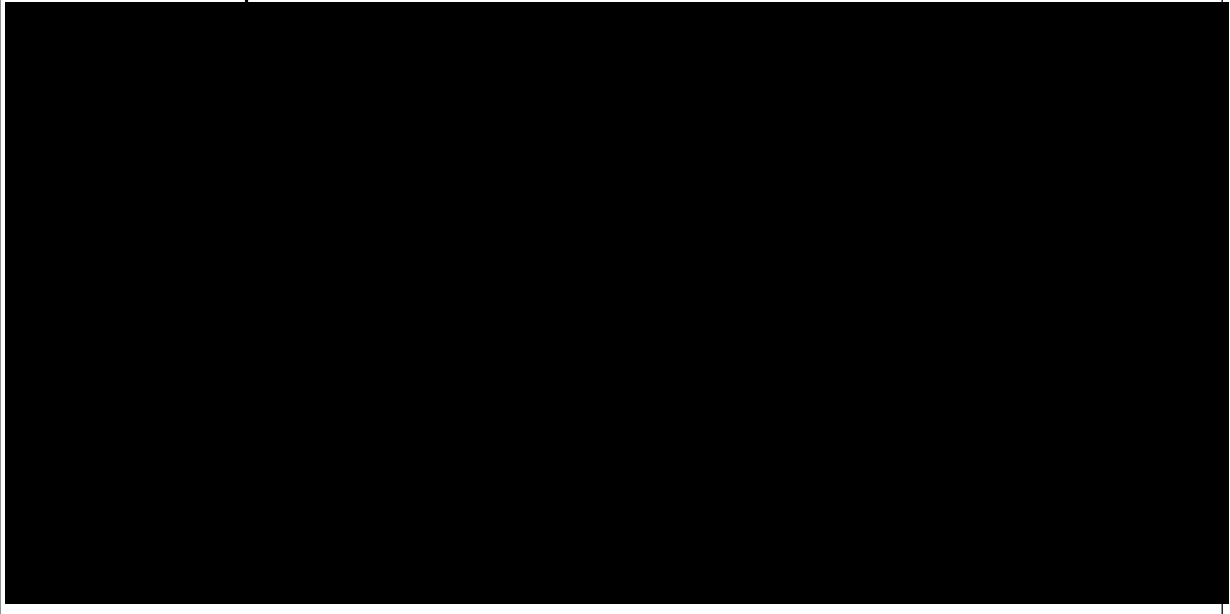


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Printed By: Frank Kohn

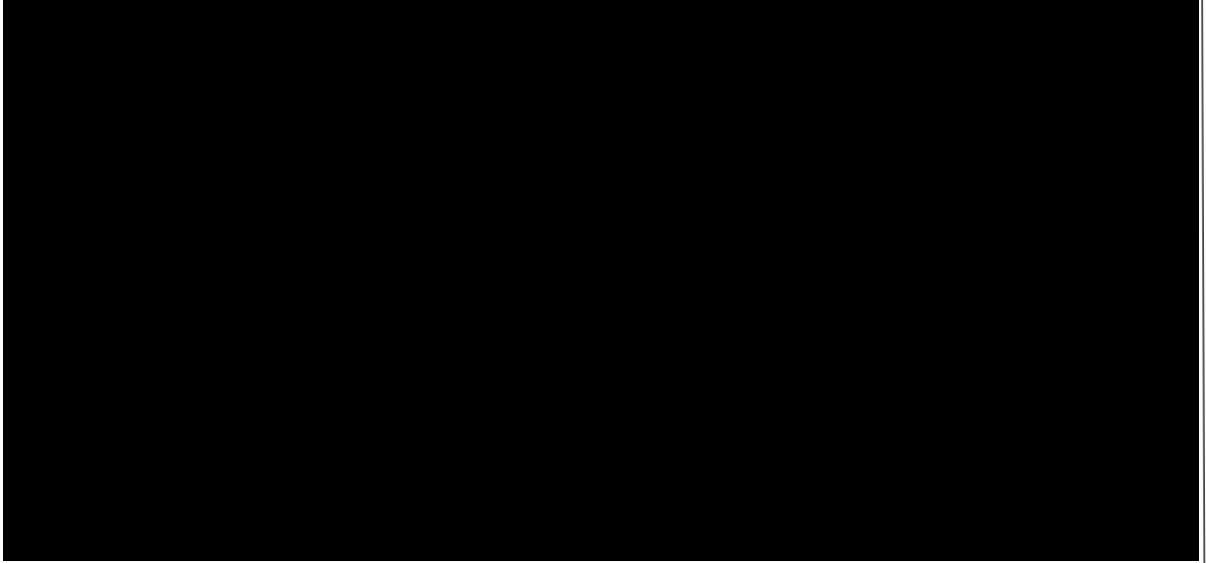
12/13/2016

8L90 8 Speed Escalade Total Product Focus



8 Speed Total RWD Product Focus - Compass

Transmission Waterfall Chart



MY17: 8 Speed Shift Quality Improvement Plan



MY18: 8 Speed Shift Quality Improvement Plan



Lessons Learned



Lessons Learned

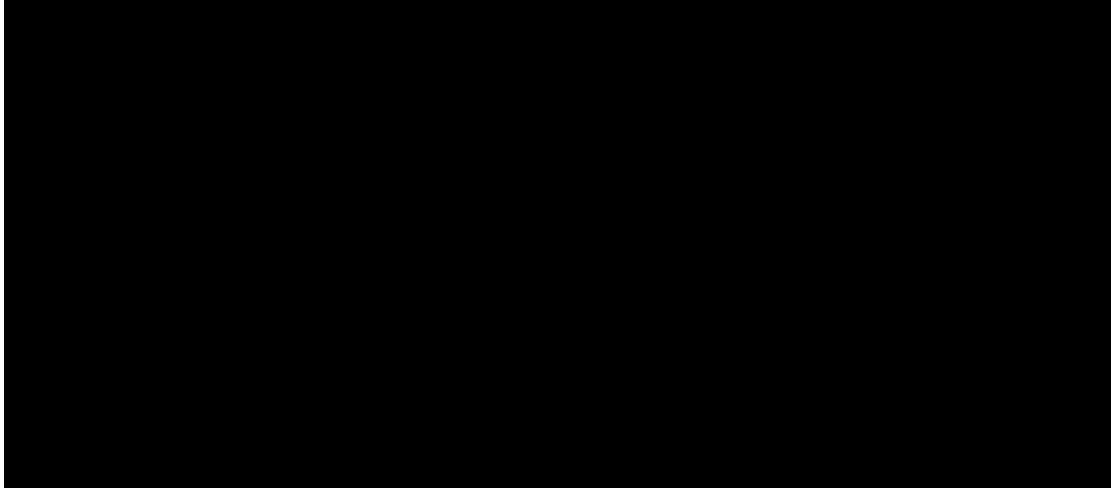


Summary



Summary

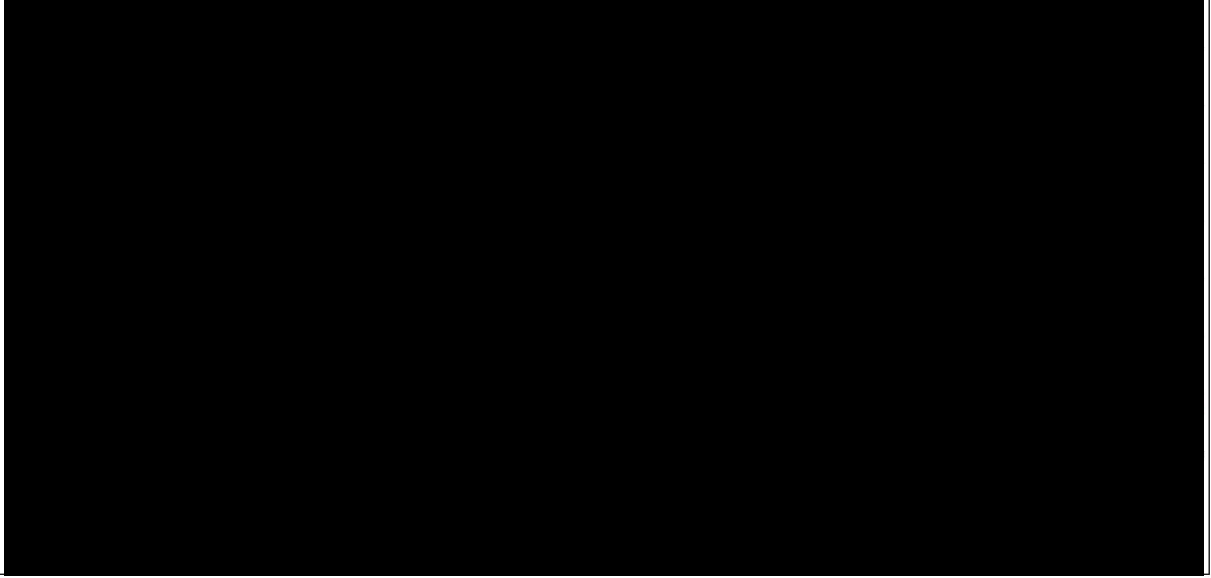
- Warranty improved 46% year over year before service fix?



Backup

Cross-Cadillac Product Focus

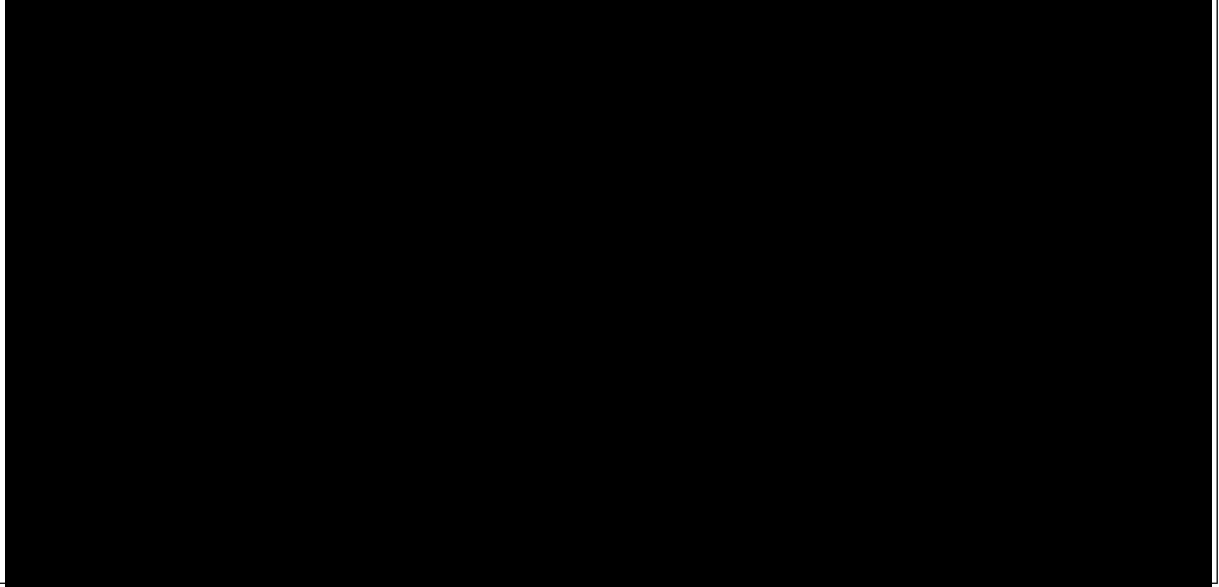
Auto Trans – Hesitates/Shift at Wrong Time



8 Speed Total Product Focus

Transmission Waterfall Chart

2015 to 2018 AT Compass PPH Improvement Plan



8 Speed Total Product Focus

Transmission Waterfall Chart

2015 to 2018 AT Compass PPH Improvement Plan

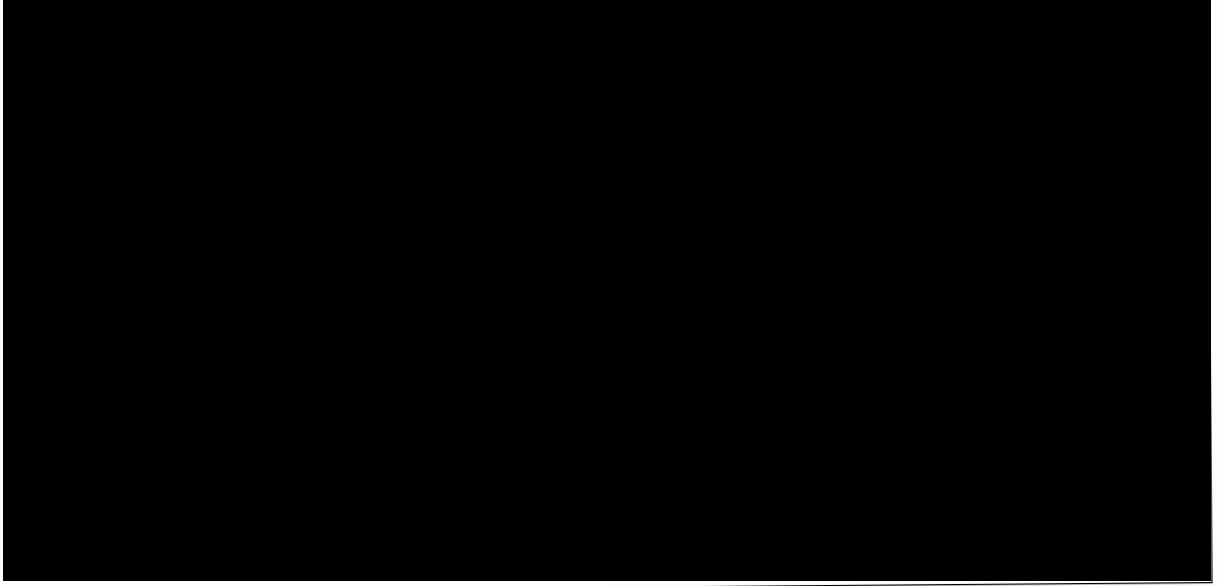


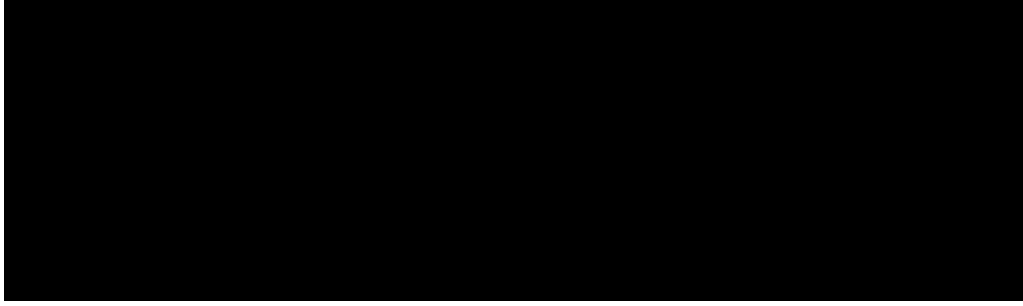
EXHIBIT 44

8L** Hard Shift Items Update

- [REDACTED]
- MPG Team has 2016 Escalade to evaluate Hard Shift
 - [REDACTED]
 - [REDACTED] 01/16/2022 [REDACTED]
 - [REDACTED]
 - [REDACTED]
- [REDACTED]
- [REDACTED]

Exhibit
PX 0212

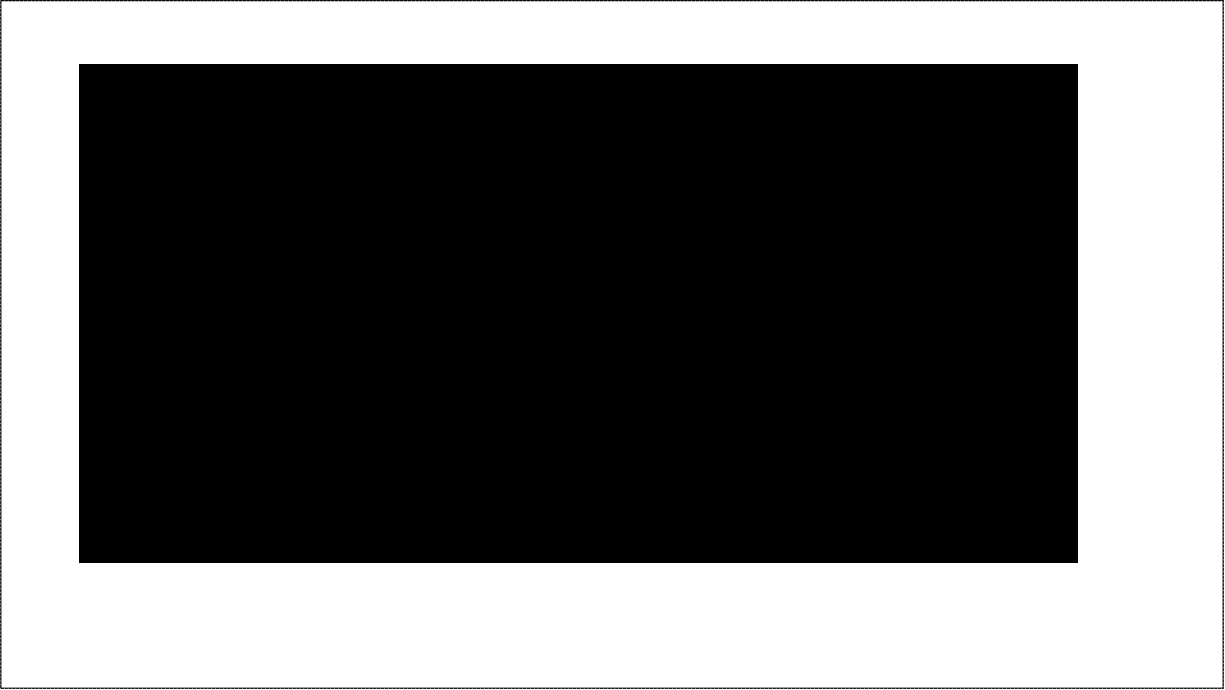
Additional Fixes in the pipeline based upon discussion with Clyde Bulloch:



Potential Solutions



- [REDACTED]
 - [REDACTED]
- TAC troubleshooting packet specific to 8 spd drive quality issues
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
- Clutch pressure and volume learn values visible to dealers, with guidelines from engineering
- [REDACTED]
- [REDACTED]
 - [REDACTED]
 - [REDACTED]



Next Steps

- GART report, determine cost/IPTV of known issues in code
- [REDACTED]
- Determine product mix of high mileage failures (trim/transfer case/retail or fleet/location/repair month)
- Find repeat failures
- Daily claims report from GART analytics group (keyword search)
- [REDACTED]
- See if there is a way to check pressure to clutch
- [REDACTED]

Transmission Sample Criteria

